中国海洋大学
OCEAN UNIVERSITY OF CHINA

CHINESE-GERMAN JOINT SYMPOSIUM

ON HYDRAULIC AND OCEAN ENGINEERING

8th

CGJOINT

QINGDAO
September 18-24, 2016

Organised by:

- College of Engineering, Ocean University of China
- Shandong Province Key Laboratory of Ocean Engineering, Ocean University of China
- Key Laboratory of Coastal Disaster and Defence （Hohai University）, Ministry of Education

BACKGROUND AND TOPICS OF THE SYMPOSIUM

Social development has tightened the interaction between human beings and the water bodies on planet earth. Human beings benefit much from inland rivers, estuaries, coastal waters and the vast open oceans through hydraulic, ocean engineering and marine renewable energy. However, it is difficult for scientists and engineers to get reasonable engineering scheme balancing between safety and economy of hydraulic, ocean engineering and marine renewable energy under extreme hydrodynamic environment usually. The situation becomes more serious when accounting for global climate changes.

Since 2002 in Rostock, the Chinese-German Joint Symposium on Hydraulic and Ocean Engineering (CGJOINT) has been a grand gathering for scientists and engineers to share ideas, new approaches and significant findings. It enhances the international exchanges and collaborations and promotes the development of scientific topics in this field.

Based on the last 7 successful symposiums, in 2016 the 8th CGJOINT will be hosted by Ocean University of China in Qingdao. The whole arrangement of the symposium includes a two-day conference and a three-day field trip, of which the primary destinations are planned in the area of Shandong Peninsula. In order to share ideas and promote collaborations more effectively, the 8thCGJOINT will focus on three oral sessions which are Coastal engineering & Hazards prevention, Ocean engineering and marine renewable energy. Other abstracts accepted will be included in poster sessions.

GROUP LEADERS

Peter Fröhle, Professor of Institute of River and Coastal Engineering Hamburg University of Technology (TUHH), Hamburg.

TAI-WEN Hsu, Professor of Department of Harbor and River Engineering and vice president, National Taiwan Ocean University, Keelung.

Huajun Li, Professor of Department of Ocean Engineering and vice president, Ocean University of China, Qingdao.

SCIENTIFIC COMMITTEE (listed alphabetically by last name)

Guohai Dong (Dalian)

Peter Fröhle (Hamburg)

Tai-Wen Hsu (Keelung)

Chia Chuen Kao (Tainan)

Jürgen Jensen (Siegen)

Huajun Li (Qingdao)

Jijian Lian (Tianjin)

Nai-Kuang Liang (Taipei)

Hua Liu (Shanghai)

Shan-Hwei Ou (Tainan)

Thorsten Schlurmann (Hannover)

Holger Schüttrumpf (Aachen)

Hongda Shi(Qingdao)

Yuanzhan Wang (Tianjin)

Weilin Xu (Chengdou)

Yixin Yan (Nanjing)

Xiping Yu (Beijing)

Ulrich Zanke(Darmstadt)

Jinhai Zheng (Nanjing)

Denghua Zhong (Tianjin)

SYMPOSIUM SECRETARIES

Local Committee Members

Chair: Hongda Shi

Members: Sheng Dong, Shuqing Wang, Song Sang, Bingchen Liang, Yong Liu, Fushun Liu, Zhen Liu, Xun Meng, Min Zhang, Aifeng Tao, Yuxiang Ma.

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BASIC INFORMATION

Symposium overview

	Sunday, 18/09/2016	Monday, 19/09/2016	Tuesday, 20/09/2016	Wednesday, 21/09/2016	Thursday, 22/09/2016	Friday, 23/09/2016	Saturday, 24/09/2016
7:30		Morning Registration					
8:00				Excursion			Checkout and departure
8:30			Session 4 & Coffee Break	Checkout	Sanggou Bay	Travel to Yantai	
9:00	Registration	Opening Ceremony		Olympic Sailing Center			
9:30					Swan Lake		
10:00		Group photo & Coffee Break	Session 5 & Coffee Break			CIMC Raffles	
10:30		Keynote Lectures					
11:00					Chengshantou		
11:30			Session 6	OUC Key Lab			
12:00		Lunch		Lunch	Lunch	Lunch	
12:30			Lunch				
13:00				Travel to Rongchen	Liugong Island	Return to Qingdao	
13:30		Session 1 & Coffee Break	Session 7 & Coffee Break				
14:00							
14:30							
15:00		Session 2	Session 8				
15:30							
16:00		Coffee Break & Session 3	Poster Session			Jihongtan Reservoir	
16:30							
17:00			Closing Ceremony			Qingdao Bay bridge	
17:30							
18:00	Ice Breaker	Evening Event Qingdao	Evening Event Qingdao	Evening Event Rongcheng	Evening Event Weihai	Evening Event Qingdao	

Symposium Locations

Symposium on Monday, 19/09, 9:00-11:30	Symposium on Monday, 19/09, 13:30-17:30	Symposium on Tuesday, 20/09, 8:30-17:30	Welcome dinner on Sunday, 18/09, 18:00	Conference dinner on Monday, 19/09, 18:00	Conference dinner on Tuesday, 20/09, 18:00
Shaw House	Multi-function Hall, 3rd floor, Academic Hall, 1st floor, Academic Exchange Center	Multi-function Hall, 3rd floor, Academic Hall, 1st floor, Academic Exchange Center	Multi-function hall, 3rd floor, Academic Exchange Center	Yibao Hotel Restaurant	Yinhai Donggang Hotel

Phone number in case of emergency

If needed, please call the following number:

86-18669835528/86-15963269193

Account and Password for Wireless Internet

Account and Password are valid for all locations of the Symposium

Network name: OceanUniversity

Password: 82931888

Symposium "Guidebook"

Web: http://www3.ouc.edu.cn/gongcheng/workshop.html

SYMPOSIUM INFORMATION

Oral presentation

Each presentation will be 12 minutes with 2-3 minutes for discussion. Presenters have to keep track of their presentation time. Hence, the total time slot for each presentation should be 15 minutes.

The final presentation files should be developed in MS PowerPoint only. On the symposium, the latest version of MS Office will be available. Presenters are kindly advised to submit their presentation file at the symposium preview desk 10 minutes before the session start at the latest. The preview desk will be operated and attended by our staff during the entire symposium. If presenters would like to use an audio or video file, please let the preview desk secretariat know in advance to let them check the presentation.

Poster presentation

Poster language is English and each poster should be printed in size A0 (84.1x118.9cm). Posters should be readable from one meter distance. The poster title, authors' name and affiliation should be written at the top. The message should be clear and understandable without explanation. A poster panel will be provided for each presentation. The poster number (P1 to P11) as given in this announcement in the session overview will be posted on the top of the panel and poster presenters are kindly advised to use the panel with their poster number. All poster presenters are requested to affix the posters on the appropriate dates and times as indicated below:

	Sunday	Monday	Tuesday
Affixation	16:00-17:00	08:00-08:30	
Removal			17:00-17:30

ACCOMPANYING PROGRAM DURING SYMPOSIUM

Monday, 19/09, 8:30-17:00:

Visiting Badaguan (Eight Great Passes), Qingdao Olympic Sailing Center

Tuesday, 20/09, 8:30-17:00:

Visiting Laoshan Mountain in the East of Qingdao

TRANSPORT INFORMATION

Pick-up Service, walking together with Guides

Monday, 19/09, 08:30, Academic Exchange Center → Shaw House.

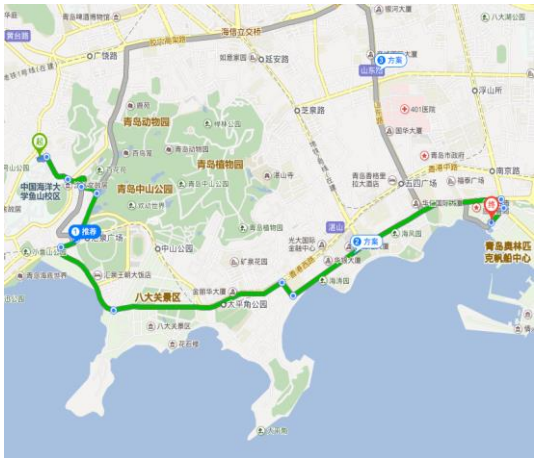
Academic Exchange Center

Shaw House

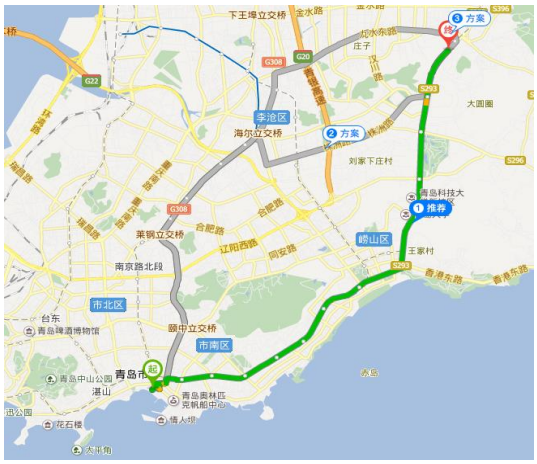
Pick-up Service, by bus

Monday, 19/09, 18:00, Academic Exchange Center → Yibao Hotel Restaurant.

Tuesday, 20/09, 18:00, Academic Exchange Center → Yinhai Donggang Hotel.

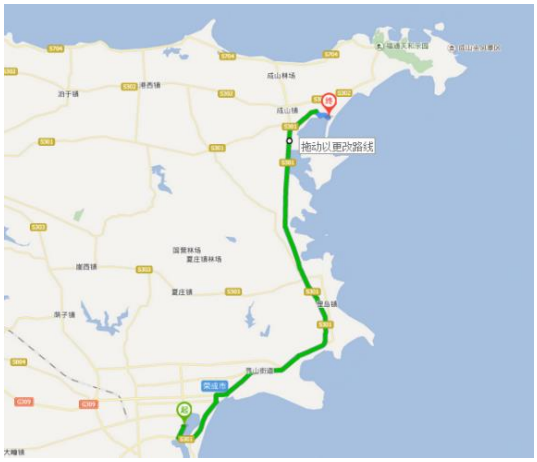


Wednesday, 21/09, 09:00, Academic Exchange Center → Olympic Sailing Center.

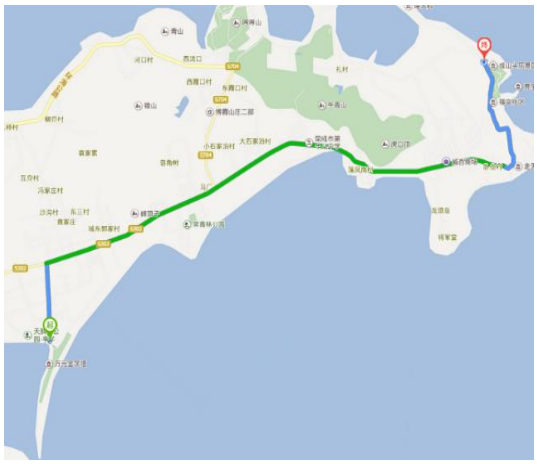


Wednesday, 21/09, 10:30, Olympic Sailing Center → Ocean Engineering Key Lab.
Wednesday, 21/09, 11:30, Lunch: Chaoyin Restaurant
Wednesday, 21/09, 13:00, Set out to Rongcheng City →Huaxing Hotel.

Thursday, 22/09, 08:30, Huaxing Hotel → Sanggou Bay.



Thursday, 22/09, 09:30, Sanggou Bay → Swan Lake.



Thursday, 22/09, 11:00, Swan Lake → Chengshantou.

Thursday, 22/09, 13:00, Chengshantou → Liugong Island.

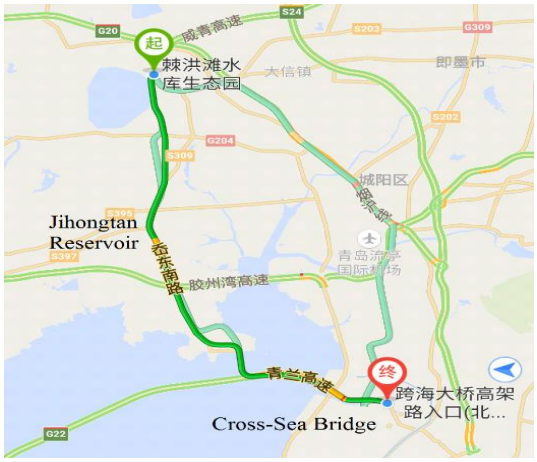
Thursday, 22/09, 17:00, Dongshan Hotel

Thursday, 22/09, 17:30, Dinner

Thursday, 22/09, 19:00, Huaxia Performance

Friday, 23/09, 08:30, Dongshan Hotel→ Raffles.

Friday, 23/09, 13:00, Raffles → Jinhongtan Reservoir.



Friday, 23/09, 17:00, Jinhongtan Reservoir → Qingdao Bay Bridge

AGENDA

Monday, 19/09	
07:30-08:30	Morning Registration
09:00-09:40	**Opening ceremony** **Chair: Prof. Hongda Shi** Welcome address by Vice President of Ocean University of China Prof. Rui Chen Addresses by Group leaders Prof. Peter Fröhle Prof. Tai-Wen Hsu Prof. Huajun Li Gifts exchange among Group Leaders
09:40-10:10	Group photo & Coffee break
10:10-11:40	**Keynote lectures** **Chair: Prof. Jinhai Zheng**
10:10-10:40	**1.** Actual Status and Future Challenges in Coastal Engineering Research in Germany **Prof. Peter Fröhle**
10:40-11:10	**2.** Development of operational ocean monitoring networks and their applications **Prof. Ching-Jer Huang**
11:10-11:40	**3.** Progresses in Global Damage Detection of Offshore Structures **Prof. Huajun Li**
11:40-13:30	Walk to Academic Exchange Center & Lunch
13:30-17:45	Sessions at Academic Exchange Center
Tuesday, 20/09	
8:30-12:30	Sessions at Academic Exchange Center
12:30-13:30	Lunch
13:30-16:30	Sessions at Academic Exchange Center
16:30-17:00	Poster Session
17:00-17:30	Closing Ceremony

Program

Session 1 **Panel Ⅰ: Coastal Engineering and Disaster**	19/09/2016 13:30 -14:45	3rd floor
Chair: Peter Fröhle; Co-chair: Chi Zhang		
13:30 -13:45	Guan-Yu Chen Remote weather system and associated swell effect on the formation of freak waves	
13:45 -14:00	Nai-Kuang Liang Typhoon swell prediction and freak wave potential	
14:00 -14:15	Lvqing Wang, Huajun Li, Bingchen Liang, Zhuxiao Shao Uncertainty Analysis of Wave Climate in China Sea	
14:15 -14:30	Ying-Chih Chen, Dong-Jiing Doong Simulation on the coastal freak wave occurrence using SPH approach	
14:30 -14:45	Markus Brühl Analysis and prediction of nonlinear dispersion of long-period waves in shallow water	
Panel Ⅱ: Ocean Engineering	19/09/2016 13:30 -14:45	1st floor
Chair: Shan-Hwei Ou; Co-chair: Yuxiang Ma		
13:30 -13:45	Ting Huang, Jinhai Zheng, Yu Yuan, Bin Wu Lateral behavior of the pile under wave-pile-soil interactions in sand	
13:45 -14:00	Sheng Dong, Dong-Jiing Doong, Shan-Hwei Ou, JinJin Zhai, ShanShan Tao Intensity classification of typhoon impacts to coasts based on the joint effect of tide level and wave height	
14:00 -14:15	Jaw-fang Lee, Chun-Han Lo Boundary element simulation of wave interaction with underwater floating structures	
14:15 -14:30	Mi-An Xue, Jinhai Zheng, Xiaoli Yuan Violent slosh-wave interaction with baffle in three-dimensional numerical tank	
14:30 -14:45	Jie Dong, Benlong Wang, Hua Liu Analysis of linear wave forces exerted on a submerged horizontal plate	

Session 2 **Panel Ⅰ: Coastal Engineering and Disaster**	19/09/2016 15:00-16:00	3rd floor
Chair: **Jisheng Zhang ,** **Co-chair:** **Guan-Yu Chen**		
15:00-15:15	Chih-Hua Chang, Chang Lin Study on solitary-wave separation from a bottom-mounted plate with different top shapes	
15:15-15:30	Christian Jordan, Oliver Lojek, Torsten Schlurmann, Guoxiang Wu, Bingchen Liang Field measurements of estuarine circulation in the Yellow River (Huanghe) estuary	
15:30-15:45	Zhong Xiao, Borui Ge, Yan Wang, Yuanzhan Wang Bearing capacity and failure mechanism of suction bucket foundation with bulkheads	
15:45-16:00	Linjian Wu, Yuanzhan Wang, Zhong Xiao, Mingwei Liu An improved method for estimating the most unfavorable load case combinations on significant components of frame-type wharfs under large water level fluctuations	
Panel Ⅱ: Ocean Engineering	19/09/2016 15:00-16:00	1st floor
Chair: **Chia Chuen Kao;** **Co-chair:** **Haijiang Liu**		
15:00-15:15	Rui He Geometrical damping of offshore monopiles under dynamic horizontal forces	
15:15-15:30	Chunyang Liu, Lin Lu, Lei Tan, Zhiwei Song, Zhongbing Zhou Experimental and numerical investigations of wave resonance in gap between two floating barges with various breadths	
15:30-15:45	Xiang Fan, Jingxin Zhang, Hua Liu Numerical investigation of the strong nonlinear wave forces on a vertical cylinder	
15:45-16:00	Dezhi Ning, Ruijia Jin, Bin Teng, Haigui Kang Interaction of oblique wave and a twin-box system with a narrow gap	

Session 3 **Panel Ⅰ: Coastal Engineering and Disaster**	19/09/2016 16:15-17:30	3rd floor
Chair: Torsten Schlurmann; Co-chair: Ching-Pao Tsai		
16:15-16:30	Chih-Chung Wen, Yong-Jun Lin, Chih-Hsuan Sung, Li-Hung Tsai, Shu-Huei Jhang, Tsung-Lin Lee Numerical study on the morphological changes of Dongsha Islands under the impact of typhoon	
16:30-16:45	Jinhai Zheng, Danjuan Fu, Gang Wang, Shanxiang Wu The trapping mechanism for long waves over the circular island with power function profiles	
16:45-17:00	Jun Wang, Dong-Young Lee, Bingchen Liang Introduction to the OUC's Research Activities Toward the Operational Coastal Morphology Prediction System	
17:00-17:15	Haijiang Liu, Lianqiang Shi Introduction of the in-situ real time nearshore monitoring technique—the ARGUS system	
17:15-17:30	S.L, Kao, T.W, Hsu, K.Y, Chang A fuzzy grounding alert system for vessel traffic service via 3D marine GIS	
Panel Ⅱ: Ocean Engineering	19/09/2016 16:15-17:45	1st floor
Chair: Markus Brühl; Co-chair: Shuqing Wang		
16:15-16:30	Aifeng Tao, Jin Yan, Ye Pei, Jinhai Zheng The swells of the East China Sea	
16:30-16:45	Shuo Wang, Xun Meng, Junfeng Du, Anteng Chang, Xiangyu Wang, Huajun Li Numerical Study of Ballast Weights Scheme for Scaled Model Experimentof Large Offshore Floating Structures	
16:45-17:00	Heng Jin , Yong Liu , Huajun Li Numerical simulation on sloshing in a sway tank with a submerged horizontal perforated plate	
17:00-17:15	Chun-Han Ko, Ching-Piao Tsai, Ying-Chi Chen Study on berm deformation affected by submerged breakwater during storm wave	
17:15-17:30	Yu-Chen Lee, Dong-Jiing Doong A study on the swell and wind sea separation methods	
17:30-17:45	Ying Li, Bin Wang Analytical Method of Buried Steel Pipelines Subjected to Strike-slip Faults	

Session 4 **Panel Ⅰ: Coastal Engineering and Disaster**		20/09/2016 8:30-9:45	3rd floor
Chair:	**Chih-Hua Chang;** **Co-chair:** **Zhong Xiao**		
8:30-8:45	Yang Zhao, Yong Liu, Huajun Li Oblique Wave Motion over Multiple Submerged Porous Bars Near a Vertical Wall		
8:45-9:00	Huanghao Hu, Wei Zhang, Mingkai Guan Long-term morphological change and its causes in the Pearl River estuary		
9:00-9:15	Xiaozhou Ma, Yunpeng Gao, Yuxiang Ma, Guohai Dong Numerical analysis of the nonlinear parameterization of waves in currents over a submerged sill with a non-hydrostatic model		
9:15-9:30	Yuxiang Ma, Dianyong Liu, Marc Perlin, Guohai Dong An experimental study on weakly three-dimensional wave interaction for wave trains with a 12° approaching angle		
9:30-9:45	Yang Zhang, Zhili Zou, Dapeng Sun, Wushan Xue Spatial distribution features of suspended sediment concentration in the surf zone		
Panel Ⅱ: Ocean Engineering and Coastal Engineering		20/09/2016 8:30-9:45	1st floor
Chair:	**Haigui Kang;** **Co-chair:** **Tsung-Lin Lee**		
8:30-8:45	Mingjin Zhang, Yanhua Yang, Huaqing Zhang Study on the computing methods of mixed layer depth and gradation		
8:45-9:00	Jie Yang, Jun Kong, Jianfeng Tao Modelling the water flushing properties of the Yangtze estuary and the adjacent waters		
9:00-9:15	Yang-Ming Fan, Shunqi Pan, Chia Chuen Kao, Jia-Ming Chen Optimisation of multi-model ensemble wave forecasting		
9:15-9:30	Shin-Jye Liang, Tai-Wen Hsu, Chi Dai, and Chieh-Chang Kuo Green Island Vortex Simulations Using Flow Fluxes Based Shallow-Water Model		
9:30-9:45	Mike Lieske, Torsten Schlurmann Effects of Obliquely Opposing and Following Currents on Wave Propagation in a New 3D Wave-Current Basin		

Session 5 **Panel Ⅰ: Coastal Engineering and Disaster**	20/09/2016 10:00-11:15	3rd floor
Chair: Jaw-Fang Lee; Co-chair: Lin Lv		
10:00-10:15	Tai-Wen Hsu, Li-Chang Hsu, Shan-Hwei Ou, Yi-Shing Chang, Shin-Jye Liang, Coastal erosion and measures at Ketzeliau Coast, Taiwan	
10:15-10:30	Ruey-Syan Shih, Wen-Kai Weng Experimental study on the characteristic of tsunami generation by slumps and landslides	
10:30-10:45	Fei Fan, Zhenlu Wang, Bingchen Liang, Yuchuan Bai, Zhixia Zhu Numerical Study of the Local Scour Around Pipeline in Steady Flow with CFD Model	
10:45-11:00	Verena Krebs, Till Quadflieg, Christian Grimm, Max Schwab, Holger Schüttrumpf Development of a sensor-based dike monitoring system for coastal dikes	
11:00-11:15	Jianlong Feng, Hans von Storch, Ralf Weisse, Wensheng Jiang Changes of storm surges in the Bohai Sea derived from a numerical model simulation, 1961-2006	
Panel Ⅱ: Marine Energy	20/09/2016 10:00-11:00	1st floor
Chair: Dong-Jiing Doong; Co-chair: Fushun Liu		
10:00-10:15	Jie Gao,Xiwu Gong, Heng Zhang,Yuefeng Ge Study on the Aerodynamic Performance of the Floating Wind Turbine under the Condition of Pitching	
10:15-10:30	Chi-yu Li, Fong-lin Chen, Wen-kai Weng Study on the energy conversion efficiency enhancement of a fixed point absorption wave converter	
10:30-10:45	Haigui Kang, Xuanlie Zhao, Dezhi Ning Study on the use of porous structures in heave-type WEC	
10:45-11:00	Ralf Weisse, Frauke Wiese Using multi-decadal met-ocean hindcasts and scenarios for assessing marine renewable energy potential	

Session 6 **Panel Ⅰ: Coastal Engineering and Disaster**	20/09/2016 11:30-12:30	3rd floor

Chair: Hongda Shi; Co-chair: Yang-Ming Fan

11:30-11:45	Nils B. Kerpen, Daniel B. Bung , Daniel Valero, Torsten Schlurmann Energy dissipation within the wave run-up at stepped revetments
11:45-12:00	Hui Liu, Haijiang Liu Experimental study on the dam-break hydrodynamic characteristics at the gate location
12:00-12:15	Yuan-Jyh Lan, Tai-Wen Hsu, Yi-Shiang Lin Extended wind wave model for effect of submerged porous media
12:15-12:30	Fengdan Wen, Lin Ju Study on Sound Propagation in shallow water Environment

Panel Ⅱ: Marine Energy	20/09/2016 11:30-12:30	1st floor

Chair: Shin-Jye Liang; Co-chair: Zegao Yin

11:30-11:45	Gilwon Kim, Keyyong Hong, Seung-Ho Shin, Young-Duk Kim and Zhen Liu Experimental evaluation of integrated performance for Yongsoo OWC Pilot Plant
11:45-12:00	Shujie Wang, Youdong Wang, Peng Yuan, Xiancai Si, Lanjian Liang Experimental study of salinity gradient energy on module scale
12:00-12:15	Xuefeng Xu, Wankang Yang, Zhijia Zheng, Tianzhu Yang, Chuankun Wang, Weiyong Shi Theoretical calculation on trappable tidal current energy in tidal channel
12:15-12:30	Jisheng Zhang, Cong Ding Numerical study on array impacts of tidal stream turbines in Zhoushan demonstration project, China

Session 7		20/09/2016	3rd floor
Panel Ⅰ: Coastal Engineering and Ocean Engineering		13:30 -15:00	
Chair:	**Dezhi Ning;** **Co-chair:** **Ralf Weisse**		
13:30 -13:45	Dirk Carstensen, Jens Wilhelm Flood defences considering the interaction of loads and engineering structures in urban regions		
13:45 -14:00	Rui Liu, Xueqing Zhang, Bing Shi, Bingchen Liang Numerical Study on the Influences of Water-regulation on Mass Transport Processes in the Yellow River Estuary, China		
14:00 -14:15	Hans von Storch, Wensheng Jiang, Kazimierz K. Furmanczyk Storm surge case studies		
14:15 -14:30	Anteng Chang, Junfeng Du, Shuqing Wang An investigation on efficient methods for non-Gaussian fatigue damage assessment of mooring lines		
14:30 -14:45	Norman Dreier, Peter Fröhle Operational wave now and forecast in the German bight as a basis for the assessment of wave-induced hydrodynamic loads on coastal dikes		
14:45 -15:00	Sunwei Li, Yi, Q, Li, S, Zhao, S, Qi H. A FFT-based spectral method to obtain dynamic responses of floating wind turbine foundation considering non-zero initial conditions and characteristics of the South China Sea		
Panel Ⅱ: Marine Energy		20/09/2016 13:30 -15:00	1st floor
Chair:	**Chih-Chung Wen;** **Co-chair:** **Zhen Liu**		
13:30 -13:45	Shanshan Huang, Mengyuan Guo, Ke Fan, Ning Zhuang, Da Chen Dynamic response and structure optimation for spar foundation of offshore wind turbine under combined action of loads		
13:45 -14:00	Wei Li, Xiangyuan Zheng, Weidong Rong Wave run-up on tripod offshore wind turbine foundations		
14:00 -14:15	Xun Meng, Meng Liu, Xiaohan Liu, Xiaohui Tang, Changzhi Wu Reliability Based Multi-criteria Decision Making forTripod Supports with Large Capacity Offshore Wind Turbines		
14:15 -14:30	Ying Cui, Beom-Soo Hyun, Zhen Liu , Kilwon Kim Comparative Study of Performances between Impulse and Wells Turbines with Enhanced Techniques for Wave Energy Conversion		
14:30 -14:45	Jing Yang, Dahai Zhang, Hui Liang, Ying Chen, Ming Tan, Wei Li, Xiandong Ma Design, optimization and numerical modelling of a novel floating pendulum wave energy converter with tide adaptation		
14:45 -15:00	Jianmei Chen, Baigong Wu, Guangyan Li,Wanqiang Zhu, Mingqi Xu, Jingfu Guo, Xueming Zhang Design and analysis of a novel adaptive blade for horizontal axis tidal current turbine		

Session 8 **Panel Ⅰ: Coastal Engineering and Ocean Engineering**	20/09/2016 15:15 -16:30	3rd floor

Chair: Hans von Storch; Co-chair: Yong Liu

15:15-15:30	Jiefeng Chen, Qi Yang , Chengcheng Liu, Fushun Liu Response of Semi-submerged Platform in Time and Frequency Domain and Energy Spectrum Comparison
15:30-15:45	Arne Arns The impact of sea level rise on coastal design levels: a case study for the northern part of the German Bight
15:45-16:00	Jürgen Jensen, Jessica Schmidt, Arne Arns Sea level changes in the southwestern Baltic Sea
16:00-16:15	Niehüser, S, Arns, A, Dangendorf, S, Jensen, J. Forecasting high resoluted water levels for the German Bight
16:15-16:30	Jinjin Zhai, Sheng Dong Met-Ocean Design Parameter Estimation for Fixed Platform Based on Copula Functions

Panel Ⅱ: Marine Energy	20/09/2016 15:15 -16:30	1st floor

Chair: Nai-Kuang Liang; Co-chair: Nils Kerpen

15:15-15:30	Zhongliang Yang, Qin Ye, Weiyong Shi A preliminary study on estimating wave power under natural conditions based on measured wave elements
15:30-15:45	Yage You, Zhenpeng Wang, Chao Zhang Design and optimization of mooring system of offshore wave energy converter
15:45-16:00	Yaqun Zhang, Songwei Sheng, Yage You, Kunling Wang, Zhenxing Huang Design, simulation and testing of the hydraulic power take off system for the Sharp Eagle wave energy converter
16:00-16:15	Meizheng Li, Zhaohang Liu, Zhen Chen, Ming Li Operation control for tidal stream turbines
16:15-16:30	Nianxin Ren, Wei Li, Zhe Ma, Yugang Li, Jinping Ou Dynamic response of a combined mono-pile wind turbine and heave-type wave energy converter system

Poster Session	20/09/2016 16:30-17:00	3rd floor
Tsung-Lin Lee, Tai-Wen Hsu, Ching-Jer Huang, Chih-Chung Wen Applied the back-propagation neural network to predict sea-level changes Qingyang Zhang, Chi Zhang, Jinhai Zheng Parameterization of nearshore wave front slope Haiying Niu, Xiaozhou Ma, Yuxiang Ma, Guohai Dong An analytical model for typhoon wind field based on logarithmic spiral trajectory Bo Liao, Yuxiang Ma, Xiaozhou Ma, Guohai Dong A nonlinear Schrödinger equation for gravity waves with linear shear currents in infinite water Zeyu Tan, Haijiang Liu A revisit to the wave boundary layer streaming phenomenon-the Eulerian velocity in Longuet-Higgins (1957) Aifeng Tao, Yi Wang, Jun Fan, Haofeng Yu, Shuo Li Wave power focusing due to the Bragg Resonance Jinhai Zheng, Chunyan Zhou, Jincheng Wang, Hongjun Zhao Numerical simulation of typhoon induced storm surge along Jiangsu Coast Ching-Piao Tsai, Ying-Chi Chen, Chun-Han Ko, Yu-Jie Pan Study on dam-break flow acting on a bridge deck Roland Hesse, Peter Fröhle Modelling estuarine cohesive sediment dynamics and net-deposition at the ETM Wen-Juinn Chen, Jou-Han Wang Sea level rise and its impact on beach erosion in Tainan coast Xufei Liu, Yuanzhan Wang Research on the effect of roots on slope stability under seepage		

CV

PS: LST by the Alphabet of Family Name

MARKUS BRÜHL

Title: Dr.-Ing.
Department: Coastal Research Center (FZK), Hannover
Address: Universität Hannover and TU Braunschweig
E-mail: bruehl@fzk-nth.de

EDUCATION:

Dr.-Ing., Technische Universität Braunschweig, Germany, Faculty of Architecture, Civil Engineering and Environmental Sciences (2014)
Diploma in Civil Engineering, TU Braunschweig, Germany

WORK EXPERIENCE:

Senior Researcher, Coastal Research Center (FZK), Hannover, Germany (since 2015)
Senior Researcher, Institute of Fluid Mechanics, TU Braunschweig, Germany (2014-2016)
Research Associate, Leichtweiß-Institute for Hydraulic Engineering and Water Resources (LWI), TU Braunschweig, Germany (2003-2013)

RESEARCH INTERESTS:

Analysis and propagation of nonlinear waves; data analysis in time and time-frequency domain; nonlinear Fourier transform; Hilbert-Huang-Transform; wave generation in flumes and basins; wave-wave and wave-structure interaction with nonlinear waves

PROFESSIONAL MEMBERSHIPS / AWARDS:

Matthäi Award 2014 from the Faculty of Architecture, Civil Engineering and Environmental Sciences, TU Braunschweig, for an excellent doctoral thesis
American Society of Mechanical Engineers (ASME), Ocean, Offshore and Arctic Engineering Division (OOAE); German Port Technology Association (HTG); European Geosciences Union (EGU)

SELECTED PUBLICATIONS OR RESEARCH PROJECTS:

Brühl, M. (2014): Direct and inverse nonlinear Fourier transform based on the Korteweg-deVries equation (KdV-NLFT) - A spectral analysis of nonlinear surface waves in shallow water. Dissertation (http://www.digibib.tu-bs.de/?docid=00058144). Leichtweiß-Institute (LWI), TU Braunschweig, Braunschweig, Germany.
Brühl, M.; Oumeraci, H. (2014): Analysis of propagation of long waves in shallow water using the nonlinear Fourier transform (NLFT). OMAE2014-24165, 9 pp.

Brühl, M.; Oumeraci, H. (2012): Nonlinear decomposition of transmitted wave trains from soliton fission using "Nonlinear Fourier transform (NLFT)": The spectral basic components. OMAE2012-83418, 10 pp.

NAME: Chih-Hua Chang (張志華)

Title: Associate Professor
Department: Information and Management. Natural Science Division in General Education Center
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EDUCATION:

Ph.D. (1992-1997)：Chung Kung Uni., Dep. of Hydraulics and Ocean Engineering, Taiwan.

WORK EXPERIENCE: 2012 – Present	Associate Professor, Dept. of Information Management, Ling-Tung University (2012.8~)
June –Sep 2009, 2012	Visiting scholar, Department of Civil and Environmental Engineering, Cullen College of Engineering, University of Houston, Houston, Texas
2003 .8– 2012.7	Assistant Professor, Dept. of Information Management, Ling-Tung University
1999.9 – 2003.6	Assistant Researcher: Water Resource Research Center, Taichung, Taiwan (1999.9~ 2003.6)

RESEARCH INTERESTS:

Computational fluid Dynamics; Nonlinear water waves; Modeling in Wave-structure interaction; Geographic Information System

PROFESSIONAL MEMBERSHIPS / AWARDS:

Best Paper Award: „Characteristics of Vortex Structure Induced by a Solitary Wave Propagating over a Rectangular Cavity", Journal of Coastal and Ocean Engineering, 7(2): 1-24, (2007).

Best paper Award: „Wave produced by a jet in the Sea bottom", Journal of Coastal and Ocean Engineering, 11(2): 79-99, (2011).

SELECTED PUBLICATIONS OR RESEARCH PROJECTS:

1. Chih-Hua Chang*, Keh-Han Wang, and Ping-Cheng Hsieh, "Fully Nonlinear Model for Simulating Solitary Waves Propagating through a Partially Immersed Rectangular Structure", *Journal of Coastal Research* (SCI), (2016, accepted)

2. Chih-Hua Chang* and Chang Lin, "Effect of solitary wave on viscous-fluid flow in bottom cavity", *Environ Fluid Mech* Vol. 15:1135–1161 (SCI) (2015, Feb).

3. Chih-Hua Chang* and Keh-Han Wang, "Numerical study on three-dimensional waves produced by a bottom jet", *Applied Ocean Research*, Vol. 50, pp.141-154, (SCI, EI) (2015, Feb).

ANTENG CHANG

Phd candidate

College of Engineering

238 Songling Road, Qingdao

cbczye2002@163.com

Education:

PhD: Ocean University of China, 2013-now

BEng: Ocean University of China, 2007-2011

Work Experience:

Research Interests:

Mooring system analysis

Professional Memberships / Awards:

Selected publications or research projects:

Anteng CHANG, Junfeng DU, Shuqing WANG, Huajun LI. Wave-scatter Lumping Strategies for Fatigue Damage Assessment. The Eleventh ISOPE Pacific/Asia Offshore Mechanics Symposium, 2014.

Anteng CHANG, Junfeng DU, Shuqing WANG, Huajun LI. Probabilistic Research on System Response of a Moored Platform in Non-Gaussian Seas. The Twenty-sixth International Ocean and Polar Engineering Conference, 2016.

DA CHEN

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Education:

PhD: University of Science and Technology of Lille, France, 2002 – 2005
M.S: University of Science and Technology of Lille, France, 2001 – 2002
Hohai University, China, 2000 – 2001
BEng: Hohai University, China, 1995 – 1999

Work Experience:

Professor, Doctoral Supervisor, Hohai University, since 2014
Associate Dean of Harbor, Coastal and Offshore Engineering, Hohai University, since 2011
Associate professor, Master Supervisor, Hohai University, 2008 – 2014
Lecturer, Hohai University, 2006 – 2008

Research Interests:

Harbor and waterway engineering
Offshore structure corrosion and prevention
Solid mechanics

Professional Memberships / Awards:

China Wind Energy Association
7th Council of China Port Association
Second Prize of Water Transportation Construction Profession Association in Science and Technology, 2014
Second Prize of Ocean Engineering in Science and Technology, 2012

Selected publications or research projects:

Chen D, Wang N, Hou L, et al. Effect of desiccation of marine environment on beam structure[J]. China Ocean Engineering, 2013, 27: 65-72.
Chen D, Huang K, Bretel V, et al. Comparison of structural properties between monopile and tripod offshore wind-turbine support structures[J]. Advances in Mechanical Engineering, 2013, 5: 175684.

Research on damage mechanism and durability of offshore concrete structure under alkali-aggregate reaction. Outstanding Youth Fund of Jiangsu Province (NO. BK2015007).

Study on the design methods of pile foundation of wind turbine in offshore wind farm. Jiangsu Electric Power Design Institute, China Energy Engineering Corporation.

WEN-JUINN CHEN

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Education:

Ph.D., Department of Civil Engineering, National Cheng Kung University, Taiwan.

Work Experience:

CHIEF OF DEPARTMENT OF CIVIL AND WATER RESOURCES ENGINEERING, NATIOAL CHIAYI UNIVERSITY/
CHIEF OF CIVIL DISASTER MITIGATION RESEARCH CENTER , NATIOAL CHIAYI UNIVERSITY.

Research Interests:

Coastal Morphdynamics, Hydraulic Model Test, Sediment Transport Mechanics, Climate Change and Coastal Management

Selected publications or research projects:

1. Wen-Juinn Chen, Ching-Ton Kuo and In-Ru Jaun. (2015). Using a Concept of Offshore Sand Reservoir for Coastal Erosion Mitigation. Proceedings of the 37th Ocean Engineering Conference in Taiwan.
2. Wen-Juinn Chen. (2015).Study on the river sediment transport in Taiwan and Its Application on Coastal Erosion Control. Proceedings of the 19th Cross strait Hydraulic Science and Technology Conference.

YING-CHI CHEN

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Education:

B.S. National Chung Hsing University(2006/9 ~ 2010/6)
M.S National Chung Hsing University(2010/9 ~ 2012/6)
PhD student National Chung Hsing University(2013/9 ~)
Ph.D. candidate(2015)

Work Experience:

Project assistant - Ministry of Science and Technology (2012/8~2012/10)
Project assistant - Ministry of Science and Technology (2013/1~2013/12)
Research Assistant - M.O.T.C(2014/1~2014/12)
Research Assistant - M.O.T.C(2015/1~2015/12)
Research Assistant - Water Resources Planning Institute (2015/3~2015/11)
Research Assistant - Ministry of Science and Technology(2015/12~2016/7)

Research Interests:

Ocean Engeering, Hydraulic Engineering, Hydrodynamic calculation, Natural Hazards, Coastal Protection

Professional Memberships / Awards:

Distinguished writing award honorable mention (2012)
Scholarship - The Taiwan Society of Ocean Engeering (2011)

Selected publications or research projects:

1. Ko, C.H., Tsai, C.P. and Chen, Y.C., (2012) " Numerical Simulations on Waves between a Submerged Breakwater and a Seawall," Proc. 34th Ocean Eng. Conf. Taiwan, pp. 213-218。
2. Ko, C.H., Tsai, C.P. and Chen, Y.C., (2013) " Numerical Simulations on Waves between a Permeable Submerged Breakwater and a Sloping Seawall," Proc. 35th Ocean Eng. Conf. Taiwan, pp. 215-220。
3. Ko, C.H., Tsai, C.P. and Chen, Y.C., Sihombing, T.O., (2015) "Numerical Simulations of Wave and Flow Variations between Submerged Breakwaters and Slope Seawall" Proc. 25st Int. Offshore and Polar Eng. Conf., Kona, Hawaii, USA, pp. 1448-1453.
4. Tsai, C.P., Chen, Y.C., Chen, C.J. and Lin, C., (2016) " Simulation of the Effect of

Breakwater on the Propagation of Solitary Waves," Journal of Marine Science and Technology, Vol. 24, No. 4.

YING-CHIH CHEN

PhD student

Dept. Hydraulic and Ocean Engineering, National Cheng Kung Univ.

Tainan City

N888041040@mail.ncku.edu.tw

Education:

2009 B.S., Dept. Marine Environmental Informatics, National Taiwan Ocean Univ.

2012 M.S., Dept. Marine Environmental Informatics, National Taiwan Ocean Univ.

Working experience:

2012 -2015 Research assistant at National Taiwan Ocean University. A Study on the Hazardous and Rapid Change Sea States.

Research Interests:

Hazardous Wave Analysis, Computational Fluid Mechanics (CFD)

Selected publications or research projects:

[1] Tsai, C.H., Doong, D.J., **Chen, Y.C.**, Yen, C.W., Maa, M.J., Tidal Stream Characteristics on the Coast of Cape Fuguei in Northwestern Taiwan for a potential power generation site, *International Journal of Marine Energy*, 2015.

[2] Doong, D.J., Tsai, C.H., **Chen, Y.C.**, Peng, J.P., Huang, C.J., Statistical Analysis on the Long-term Observations of Typhoon Waves in the Taiwan Sea, *Journal of Marine Science and Technology- Taiwan*, 2015.

[3] Doong, D.J., Tsai, C.H., **Chen, Y.C.**, Yen, C.W., Maa, M.J., Observation of Nearshore Current by Using Land-based Microwave Radar, *Journal of Photogrammetry and Remote Sensing,* Vol. 18, No. 3, pp 201-212, 2014. (in Chinese)

[4] Liang, S.J., Lan, C.Y., **Chen, Y.C**., Shallow Water Flow Modeling using Space-Time Least-Squares Finite-Element Method, *Journal of Marine Science and Technology-Taiwan,* Vol. 20, No. 5, pp. 595-602, 2012.

[5] Liang, S.J., **Chen, Y.C.**, Space-Time Least-Squares Finite-Element Method for Shallow-Water Equations, *Journal of Marine Science and Technology- Taiwan*, Vol. 19, No. 5, pp. 571-578, 2011.

GUAN-YU CHEN

Title: Professor

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guanyuc@gmail.com

Education:

Ph.D., Physical Oceanography, University of Michigan, Ann Arbor (1998)
M.S., Civil Engineering, National Taiwan University (1989)
B.S., Civil Engineering, National Taiwan University (1987)

Research Interests:

Nonlinear Waves, Internal Waves, Tsunami, Infrigravity Waves

SELECTED publications (*: corresponding author)

1. Emmy T.Y. Chang*, Benjamin F. Chao, **Guan-Yu Chen**, Jian-Ming Liau 2016, Internal tides recorded at ocean bottom off the coast of Southeast Taiwan, *Journal of Geophysical Research-Oceans*, 121, 10.1002/2015JC011370
2. **Guan-Yu Chen***, Chin-Chu Liu, and Cheng-Chung Yao, 2015, A Forecast System for Offshore Water Surface Elevation With Inundation Map Integrated for Tsunami Early Warning, *IEEE Journal of Oceanic Engineering*, DOI: 10.1109/JOE.2013.2295948.
3. **Guan-Yu Chen***, Yung-Fung Chiu, Jing-Hua Lin, Chin-Chu Liu, Yi-Wei Chang, Cheng-Jia Lien, 2014, Combining Tsunami Hazard and Vulnerability on the Assessment of Tsunami Inundation Probability in Taiwan, *Journal of Earthquake and Tsunami*, 8(3), 1440003 DOI: 10.1142/S179343111440003X.
4. **Guan-Yu Chen***, Chung-Lin Wu, and Yu-Huai Wang, 2014, Interface Depth Used in a Two-Layer Model of Nonlinear Internal Waves, *Journal of Oceanography*, 70, 329-342, DOI: 10.1007/s10872-014-0233-9.
5. Yu-Chia Chang, **Guan-Yu Chen***, Ruo-Shan Tseng , Luca Centurioni, and Peter Chu, 2013, Observed near-surface flows under all tropical cyclone intensity levels using drifters in the northwestern Pacific, *Journal of Geophysical Research-Oceans*, 118, 2367-2377, DOI:10.1002/jgrc.20187.
6. Yu-Chia Chang, **Guan-Yu Chen***, Ruo-Shan Tseng , Luca Centurioni, and Peter Chu, 2012, Observed near-surface currents under high wind speeds, *Journal of Geophysical Research-Oceans*, 117, C11026, DOI:10.1029/2012JC007996.
7. **Guan-Yu Chen***, Cho-Teng Liu, Yu-Hwui Wang, Ming-Kuan Hsu, 2011, Interaction and Generation of Long-crested Internal Solitary Waves in the South China Sea, *Journal of Geophysical Research-Oceans*, 116, C06013, 1-7, DOI:10.1029/ 2010JC006392.

CHI DAI

Master Student

Department of Hydraulic and Ocean Engineering,

National Cheng Kung University

Tainan

E-mail: judy19921106@yahoo.com.tw

Education:

2015 BS Department of Harbor and River Engineering, National Taiwan Ocean University

Work Experience:

2016 Intern in AECOM

Research Interests:

Unstructured mesh generation and finite element approximation of transport processes.

Professional Memberships / Awards:

Selected publications or research projects:

YING CUI

Ph.D. student
College of Engineering
238 Songling Road,
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Education:

2013.09 – now	Ocean University of China, Ph.D. in Harbour, Coastal and Offshore Engineering
2009.09 – 2013.07	Ocean University of China, Undergraduate student in Harbour, Channel and Coastal Engineering

Research Interests:

- Development and Utilization of Marine Renewable Energy
- Computational Fluid Dynamics and Numerical Simulation

Selected publications or research projects:

- **Zhen Liu***, Ying Cui, Kil. W. Kim, Hongda Shi. Numerical Study on a Modified Impulse Turbine for OWC Wave Energy Conversion, Ocean Engineering, 2016, 111(1): 533-542
- **Zhen Liu***, Ying Cui, Huanyu Zhao, Hongda Shi. Effects of Damping Plate and Taut Line System on Mooring Stability of Small Wave energy Converter. Mathematical Problems in Engineering, 2015, Article ID 814095, 12 pages
- **Ying Cui**, Zhen Liu*, Beom-Soo Hyun. Pneumatic Performance of Staggered Impulse Turbine for OWC Wave Energy Convertor. Journal of Thermal Science, 2015, 24(5): 1-7
- **Ying Cui**, Zhen Liu*. Effects of Solidity Ratio on Performance of OWC Impulse Turbine, Advances in Mechanical Engineering, 2015, 7(1): 1-10

GUOHAI DONG

Title: Professor

Department: The State Key Laboratory of Coastal and Offshore Engineering Dalian University of Technology

Address: The State Key Lab of Coastal & Offshore Eng., Dalian Univ. of Tech., Dalian, China, 116024.

E−mail: ghdong@dlut.edu.cn

Education:

1982-1986: Dalian University of Technology, BE in Civil Engineering
1986-1989: Dalian University of Technology, MCE in Coastal Engineering
1989-1992: Dalian University of Technology, Ph.D in Coastal Engineering

Work Experience:

1999-present Professor, Dalian University of Technology
1997-1999 Associate Professor, Dalian University of Technology
1992-1997 Lecturer, Dalian University of Technology

Research Interests:

Physical and numerical modeling nonlinear waves; CFD; Hydrodynamics of Net Cage

Professional memberships / Awards:

Member of Scientific committee International Conference on Asian and Pacific Coasts
The Second-class Ministry of education of Natural Science Award 2009
The Second-class award for Ocean Engineering Technology of China 2013
The First-class Ministry of education of Natural Science Award 2015

Selected publications or research projects:

1. Dong, G.H., Ma, Y.X., Perlin, M., Ma, X.Z., Yu, B., 2008. Experimental study of wave-wave nonlinear interactions using the wavelet-based bicoherence. Coastal Engineering 55, 741-752.
2. Dong, G.H., Ma, X.Z, Perlin, M., Ma, Y.X., Yu, B., Wang, G., 2009. Experimental study of long wave generation on sloping bottoms. Coastal Engineering 56, 82-89.
3. Dong, G.H., Sun, L., Zong, Z., Zhao, Y.P., 2009. Numerical analysis of the forces exerted on offshore structures by ship waves. Ocean Engineering 36, 468-476.
4. Dong, G.H., Ma, X.Z., Xu, J.W., Ma, Y.X., , 2009. Experimental study of the transformation of bound long waves over a mild slope with ambient currents. Coastal Engineering 56, 1035-1042.
5. Dong, G.H., Xu, T.J., Zhao, Y.P., Li, Y.C., Gui, F.K., 2010. Numerical simulation of hydrodynamic behavior of gravity cage in irregular waves. Aquacultural Engineering 42, 90-101.

DONG-JIING DOONG

Associate Professor, Dept. Hydraulic and Ocean Engineering,
Deputy Director, Coastal Ocean Monitoring Center,
National Cheng Kung University
Tainan
Email: doong@mail.ncku.edu.tw

EDUCATION:

2002 PhD National Cheng Kung University, Tainan

RESEARCH INTEREST:

Hazardous waves (typhoon waves and freak waves), Ocean wave measurement techniques (buoy, GPS, microwave radar, video camera), Ocean wave analysis technology (time and frequency domain), Sea level rise, Wave statistics, Coastal and ocean hazards related topics

Work Experience:

2012-2015	Associate Professor, Department of Marine Environmental Informatics, National Taiwan Ocean University
2012-2015	Director, Management Center of Research Vessel, National Taiwan Ocean University
2007-2012	Assistant Professor, Department of Marine Environmental Informatics, National Taiwan Ocean University
2002-2007	Project Manager, Coastal Ocean Monitoring Center, National Cheng Kung University

SELECTED PUBLICATIONS OR RESEARCH PROJECTS:

[6] Doong, D.J., Tsai, C.H., Chen, Y.C., Peng, J.P., Huang, C.J., 2015. Statistical Analysis on the Long-term Observations of Typhoon Waves in the Taiwan Sea. *Journal of Marine Science and Technology- Taiwan*, 23, 893-900.

[7] Tsai, C.H., Doong, D.J., Chen, Y.C., Yen, C.W., Maa, M.J., 2016. Tidal Stream Characteristics on the Coast of Cape Fuguei in Northwestern Taiwan for a potential power generation site. *International Journal of Marine Energy*, 13, 193-205

[8] Doong, D.J., Chuang, L.Z.H., Wu, L.C., Fan, Y.M., Kao, C.C., Wang, J.H., 2012. Development of an Operational Coastal Flooding Early Warning System, *Natural Hazards and Earth System Sciences*, Vol. 12, pp.379-390.

[9] Hsu, T.W., Doong, D.J., Hsieh, K.J., Liang, S.J., 2015. Numerical Study of Monsoon Effect on Green Island Wake, *Journal of Coastal Research*, 31, 1141-1150.

[10] Doong, D.J., Chuang, H.C., Shieh, C.L., Hu, J.H., 2011. Quantity, Distribution, and Impacts of Coastal Driftwood Triggered by a Typhoon, *Marine Pollution Bulletin*, 62, 1446-1454.

[11] Doong, D.J., Lee, B.C., Kao, C.C., 2011. Wave Measurement using GPS Velocity Signal, *Sensors*, 11, 1043-1058.

[12] Doong, D.J., Chen, S.H., Kao, C.C., Lee, B.C., 2007. Data Quality Check Procedures of an Operational Coastal Ocean Monitoring Network, *Ocean Engineering*, 34, 234-246.

YANG-MING FAN

Leader of R&D Department
Coastal Ocean Monitoring Center, National Cheng Kung University
Tainan City
ymfan@mail.ncku.edu.tw

Education:

2008	Ph.D., College of Engineering, National Cheng Kung University, Tainan
2001	M. S., College of Engineering, National Cheng Kung University, Tainan

Work Experience:

2011- present	Leader of R&D Department, Coastal Ocean Monitoring Center, National Cheng Kung University, Tainan
2008 - 2011	Assistant Research Fellow, Coastal Ocean Monitoring Center, National Cheng Kung University, Tainan
2012/ 2013/ 2015	Visiting Scientist, Cardiff University, UK

Research Interests:

Data Assimilation, Numerical Wave Modeling, Numerical Ocean Modeling, Ensemble Approach, Statistical Analysis of Waves and Water Levels

Selected publications or research projects:

PUBLICATIONS

1. Pan, S., Fan, Y.M., Chen, J.M., and Kao, C.C., Optimization of multi-model ensemble forecasting of typhoon waves, *Water Science and Engineering*, Vol. 9, Iss.1, 52-57, 2016.
2. Fan, Y.M, Günther H., Doong, D.J., and Kao, C.C., Improved boundary values of ocean wave fields using a data assimilation scheme, J*ournal of Marine Science and Technology*, Vol. 23, No. 6, pp. 943-950, 2015.
3. Fan, Y.M., Günther H., Kao, C.C., and Lee, B.C., Assimilation of decomposed in situ directional wave spectra into a numerical wave model of typhoon waves, *Natural Hazards and Earth System Sciences*, Vol. 14, pp. 73-80, 2014.

RESEARCH PROJECTS

1. Development of a 3D hydraulic numerical model for simulating waves near a real seawall, Ministry of Science and Technology, Taiwan, R.O.C., 01/08/2015-31/07/2016.
2. Extreme wave ensemble forecating under tropical cyclones, National Science Council, Taiwan, R.O.C., 01/08/2013-31/07/2015.
3. Innovative technologies for safer European coasts in a changing climate, Seventh Framework Programme, European Commission, 1/12/2009-30/11/2013.

JIANLONG FENG

National Marine Data & Information Service

93 Liuwei Road, Tianjin

jianlongf@hotmail.com

Education:

PhD: Ocean University of China, 2016

BEng: Ocean University of China, 2010

Work Experience:

National Marine Data & Information Service 2016

Research Interests:

Long-term change of the storm surge and extreme sea levels

Selected publications or research projects:

Feng. J., W. Jiang., C. Bian. (2014) Numerieal prediction of storm surge in the Qingdao area under the impact of climate change. Journal of Ocean University of China 13, 539-551.

Feng. J., W. Jiang. (2015) Extreme water level analysis at three stations on the coast of the Northwestern Pacific Ocean. Ocean Dynamics,doi:10.1007/s10236-015-0881-3

Feng. J., H. von Storch., W. Jiang., R. Weisse. Assessing changes in extreme sea levels along the coast of China. Journal of Geophysical Research, doi:10.1002/2015JC11336

Yang W., L. Zhao, P. Xu, J. Feng, T. Wang, Q. Quan and Jiang W (2013), Estimates of Reynolds stress and TKE production in the seasonally stratified East China Sea, Journal of Ocean University of China 12,549-556.

GAO JIE

Post-graduate Student
College of Ship and Ocean Engineering
NO.1 Haida South Road,
Zhoushan
3081196409@qq.com

Education:

Master: ZheJiang Ocean University, 2016

BEng: LuDong University, 2014

Work Experience:

Work in TuoWei Machinery Limited by Share Ltd located in YanTai and learned the simple operation of CNC machine,July,2011

Work in Dalian United Ship Engineering Service Co., Ltd, March.2014-August.2014

Research Interests:

Hydrodynamic performance of tidal current energy turbine. Aerodynamic performance of wind turbine.

Professional Memberships / Awards:

Second Prize of Shandong Province Mechanical and Electrical Design, 2013

Selected publications or research projects:

[1] Sun Zhuang, Gong Xiwu, Gao Jie. Low sediment concentration flow around a square cylinder cylinder and hydrodynamic characteristics of [J]. energy-saving technology, 2015,06:489-494.

[2] Gao Jie, Gong Xiwu,ZhangHeng. Study on hydrodynamic performance of vertical axis turbine in the surge and sway motion.(In process of reviewing)

[3]GaoJie, Gong Xiwu,Zhang Heng. Study on hydrodynamic performance of three dimensional vertical axis tidal current turbine. (In process of reviewing).

BORUI GE

Graduate student

School of Civil Engineering

92 Weijin Road, Tianjin

g150028@163.com

Education:

MEng: Tianjin University, 2017 (Tutor: Zhong Xiao)

BEng: Hohai University, 2014

WORK EXPERIENCE:

Research Interests:

Design method of offshore foundation; interaction between soil and structure

PROFESSIONAL MEMBERSHIPS / AWARDS:

Selected publications or research projects:

Xiao Zhong, Ge Borui, Wang Yuanzhan and Wang Yan. Effect analyses of cruciform inner clapboards on uniaxial capacities and failure modes of bucket foundation. Journal of Southeast University (Natural Science Edition). (Under Review)

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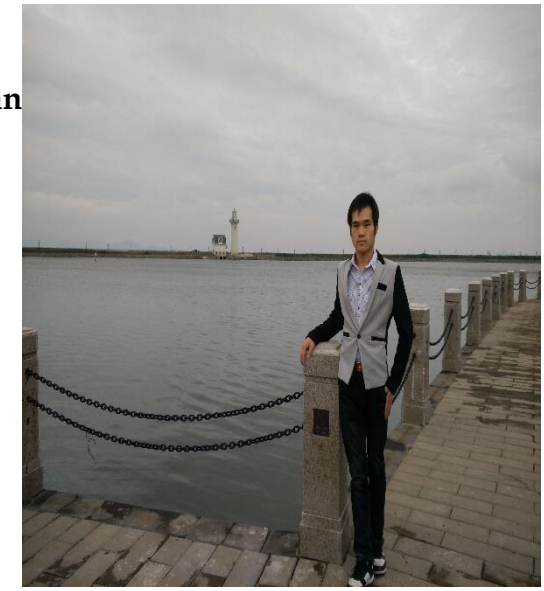

Education:

Master: ZheJiang Ocean University, 2016

BEng: ZheJiang Ocean University, 2014

Work Experience:

Work in TuoWei Machinery Limited by Share Ltd located in YanTai and learned the simple operation of CNC machine,July,2011

Work in Dalian United Ship Engineering Service Co., Ltd, March.2014-August.2014

Research Interests:

Hydrodynamic performance of tidal current energy turbine. Aerodynamic performance of wind turbine.

Professional Memberships / Awards:

Second Prize of Shandong Province Mechanical and Electrical Design, 2013

Selected publications or research projects:

[1] GE Yue-feng，GONG Xi-wu，Zhang Heng. Combustion Characteristic Analysis of Dual Fuel Diesel Engine Under The Overload Conditions.(In process of reviewing)

TAI-WEN HSU

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Department of Harbor and River Engineering,
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Education:

Dept. of Hydraulic and Ocean Engineering, National Cheng Kung University, Taiwan (Ph. D. 1990; M.S. 1984; B.S.1979)

Work Experience:

Distinguished Professor, Department of Harbor and River Engineering (February 2012~)
Director, Research Center for Ocean Energy and Strategies (February 2012~)
Dean, Office of Research and Development (February 2012~)
National Taiwan Ocean University

Research Interests:

Computational fluid dynamics
Coastal development and conservation
Nearshore Hydrodynamics
Wind wave modeling forecasting for deep and shallow water regions
Development of a warning system of coastal disaster
Ocean energy research and development

Selected publications :

1. Tsai, C.-C., Z.-H. Lin and T.-W. Hsu* (2015). Using local radial basis function collocation method to approximate radiation boundary conditions. Ocean Engineering, Vol. 105, pp. 231-241
2. T.-W. Hsu*, J.-M. Liau, S.-J. Liang, S.-Y. Tzang, D.-J. Doong (2015) Assessment of Kuroshio current power test site of Green Island, Taiwan. Rewable Energy. Vol. 81, pp. 853-863.
3. Tsai, C.-C., Y.-T. Lin and T.-W., Hsu* (2013). On the weak viscous effect of wave reflection and transmission over arbitrary trenches. Physics of Fluids, Vol. 5, 043103(21 pages).
4. Ting, C.-H., A.V. Babanin*, D. Chalikov and T.-W. Hsu (2012). Dependence of drag coefficient on the directional spreading of ocean waves. Journal of Geophysical Research, Vol. 17, C00j14.1-7.

5. Toledo, Y., T.-W. Hsu* and A. Roland (2012). Extended time-dependent mild-slope and wave action equations for wave-bottom and wave-current interactions. Royal Society Series A, Vol. 468, pp. 184-205.

CHING-JER HUANG

Prof. Dr.
Department of Hydraulic and Ocean Engineering,
National Cheng Kung University (NCKU)
Tainan City
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Education:

Diploma (1984): Department of Mechanical Engineering, Swiss Federal Institute of Technology Zurich (ETH Zurich), Switzerland.
Ph. D. (1991): Department of Mechanical Engineering, The University of Iowa, U.S.A.

Work Experience:

Director: 2010/2 - present, Coastal Ocean Monitoring Center, NCKU
Professor: 2002/8 - present, Department of Hydraulic and Ocean Engineering, NCKU
Visiting Lecturer: 1992/3 -1992/7, Department of Mechanical Engineering, University of Hong Kong

Research Interests:

Interaction of water waves and offshore structures
Ocean monitoring and tsunami detection
Sound propagation in bubbly liquids and its applications in underwater noise reduction
Monitoring of debris flows and landslides

Professional Memberships / Awards:

Service Award, 2016, Chinese Ocean and Underwater Technology Association.
Committee Member of IAPSO @ Chinese Taipei, 2016-2020.

Selected publications or research projects:

1. Huang, C.J., Chang, H.H., and Hwung, H.H. (2003) Structural permeability effect on the interaction of a solitary wave and a submerged breakwater, **Coastal Engineering**, Vol. 49, pp. 1-24.
2. Huang, C.J., Yin, H.Y., Chen, C.Y., Yeh, C.H., Wang, C.L. (2007) Ground vibrations produced by rock motions and debris flows, **J. Geophys. Res.**, Vol. 112, F02014, doi:10.1029/2005JF000437, pp. 1-20.
3. Huang, C.J., Chen, C.H., and Chang, H.H. (2011) Propagation of water waves over permeable rippled beds, **Ocean Engineering**, Vol. 38, pp. 579-591.
4. Huang, C.J., Chu, C.R., Tien, T.M., Yin, H.Y., and Chen, P.S. (2012) Calibration and deployment of a fiber-optic sensing system for monitoring debris flows, **Sensors**, Vol. 12, pp. 5835-5849.
5. Lee, C.H. and Huang, C.J. (2012) Kinetic-theory-based model of dense granular flows down inclined planes, **Physics of Fluids**, Vol. 24, pp. 1-12.
6. Huang, C.J., Lin, C.Y., and Chen, C.H. (2015) Numerical simulations of

fluid-structure interaction based on Cartesian grids with two boundary velocities, **Int. J. Numer. Meth. Fluids**, Vol. 79, pp. 138-161.

SHANSHAN HUANG

Master student

College of Harbor, Coastal and Offshore Engineering, Hohai University

1 Xikang Road, Nanjing, Jiangsu, 210098

huangshsh2011@163.com

Education:

M.S: Hohai University, China, since 2015

BEng: Hohai University, China, 2011 – 2015

Research Interests:

Harbor and waterway engineering

Selected publications or research projects:

Chaohua Jiang, Shanshan Huang, Yuwen Zhu, Yifeng Lin, Da Chen. Effect of Polypropylene and Basalt Fiber on the Behavior of Mortars for Repair Applications[J]. Advances in Materials Science and Engineering, vol. 2016, Article ID 5927609, 11 pages, 2016. DOI: 10.1155/2016/5927609.

Shanshan Huang, Da Chen, Xiaochen Zhang, Yangfeng Ou. Research on new joints structure of high-piled wharf[J]. Journal of Waterway and Harbor, 2016, 37(3): 284-287.

Peng Gao, Shanshan Huang, Yangfeng Ou, Da Chen. Research on simplified calculation method of bending moment of continuous beam with wide bearing[J]. Journal of Waterway and Harbor, 2016, 37(1): 89-95.

HUANGHAO HU

Title: Postgraduate

Department: College of Harbor, Coastal and Offshore Engineering, Hohai University

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E-mail: huhuanghaohhu@qq.com

Education:

2010.09~2014.06: Undergraduate

College of Engineering, Ocean University of China

2014.09~ : Postgraduate

College of Harbor, Coastal and Offshore Engineering, Hohai University

Work Experience:

2016.01~2016.06 : College of Harbor, Coastal and Offshore Engineering, Hohai University

Research on: Morphological change in the Pearl River Estuary

Research Interests:

Morphplogical evolution in the Pearl River Estuary

Estuary hydrodynamics: Nonstationary tidal behavior in the Pearl River

Professional Memberships / Awards:

none

Selected publications or research projects:

none

HENG JIN

Phd candidate

College of Engineering

238 Songling Road, Qingdao

jinheng8899@163.com

Education:

PhD: Ocean University of China, 2013-now

BEng: Ocean University of China, 2007-2011

Work Experience:

Research Interests:

sloshing

Professional Memberships / Awards:

Selected publications or research projects:

Jin H, Liu Y, Li H J. Experimental study on sloshing in a tank with an inner horizontal perforated plate[J]. Ocean Engineering, 2014, 82: 75-84.

Jin H, Liu Y, He S, et al. Numerical Study on the Wave Dissipating Performance of a Submerged Horizontal Plate Breakwater Using OpenFOAM[C]The Eleventh ISOPE Pacific/Asia Offshore Mechanics Symposium. International Society of Offshore and Polar Engineers, 2014.

CHRISTIAN JORDAN

Research Associate

Franzius-Institute for Hydraulic, Estuarine and Coastal Engineering

Leibniz Universität Hannover

Nienburger Straße 4, 30167 Hannover

jordan@fi.uni-hannover.de

Education:

10/2006 – 09/2013: Studies of Civil Engineering (Dipl.-Ing.) with focus on Water and Environmental Engineering at Leibniz University Hannover, Germany

Work Experience:

Since 04/2014: Research Associate and PhD candidate at Franzius-Institute

Research Interests:

Hydro- and morphodynamics of coastal and estuarine environments, Numerical Modelling

Professional Memberships / Awards:

Gesellschaft der Förderer des Franzius-Instituts e.V.

Hafentechnische Gesellschaft e.V.

Award of the "Gesellschaft der Förderer des Franzius-Instituts e.V." for Diploma thesis (2014)

Selected publications or research projects:

[1] Jordan, C., Lojek, O., Stahlmann, A., Schlurmann, T. (2015): Numerical modeling of estuarine circulation and morphodyanmics in the Yellow River Delta and Bohai Sea, In: E-proceedings of the 36th IAHR World Congress. The Hague, The Netherlands.

[2] Jordan, C., Lojek, O., Stahlmann, A., Schlurmann, T. (2015): Analyse und numerische Simulation der Hydro- und Morphodynamik im Delta des Gelben Flusses, China, Tagungsband zum Kongress der Hafentechnischen Gesellschaft e.V. 2015 - Bremen, Eigenverlag HTG, pp. 153-162.

[3] DELIGHT: Delta Information System for Geoenvironmental and Human Habitat Transition.

NAME HAIGUI KANG

Title: Professor
Department: Institute of Hydraulic Engineering
Address: Institute of Hydraulic Engineering , Dalian University of Technology , Dalian 116024, P.R. China
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Education:

1964.9-1969.7 Undergraduate , Dept. of Hydraulic Engineering, Dalian Institute of Technology

Work Experience:

1996.8-Present Professor, Dept. of Civil Engineering, Dalian University of Technology
1991.11-1996.7 Assistant Professor Dept. of Civil Engineering, Dalian University of Technology
1991.11-1993.1 Visiting Professor, Hydraulics Research Ltd. Wallingford , UK
1969.8-1991.10 Lecturer, Dept. of Civil Engineering, Dalian University of Technology

Research Interests:

Physical and numerical tests of hydrodynamic loads on coastal and offshore structures

Measurement technique of velocity and concentration fields by using the PIV (Particle Image Velocimetry) and LIF (Laser Induced Fluorescence) techniques；

Research on marine energy application techniques.

Professional Memberships / Awards:

Vice-President of Chinese Ocean Engineering Society Elected 1999

Vice-President of Society of Oceanography of Liaoning Province Since 1998

Selected publications or research projects:

Studies on a Novel Vertical-axis Tidal Current Energy Conversion Device, financial supported by the National Bureau of Oceanography, 2011~2013,（GHME2011CL01）

Study on the Vertical Pipe-restrained Floating Breakwater Doubled as Wave Power Generation Device, financial supported by the National Natural Science Foundation of China ,2014~2017, (No.51379037).

PROF. DR.-ING. CHIA CHUEN KAO

Title: Professor Emeritus

Department: Department of Hydraulic and Oce Engineering, NCKU

City: Tainan

E-mail: kaoshih@mail.ncku.edu.tw

Education

Dr.-Ing., Leibniz Universität Hannover, Germany

Work Experience:

Honorable Professor, Dalian University of Technology in China
Editor, Journal of China Ocean Engineering (Nanjing)
Honorable Professor, Hohai University in China
Diecetor General, Taiwan Ocean Research Institute

Research Interests:

Meteo-Oceanographic Observation,
Offshore Engineering – Oil Platform, Underwater Pipeline, Wind Mill
Coastal Engineering – Coastal Erosion, Beach Nourishment

Professional Memberships / Awards:

2013, Engineering Medal of the Year, Chinese Institute of Engineers
2014, "Da-Yu" Award, Ministry of Economic Affairs
Acting Board Member, Chinese Ocean and Undersea Technology Association
Acting Board Member, Verein der DAAD-Freunde
Acting Board Member, China Ocean Engineering Society, Nanjing
Board Member, Chinese Society of Oceanography, Beijing

SHENG-LONG KAO

ASSISTANT PROFESSOR,
DEPARTMENT OF TRANSPORTATION SCIENCE
DIRECTOR,
DIVISION OF INTERNATIONAL STUDENT AFFAIRS
NATIONAL TAIWAN OCEAN UNIVERSITY
KEELUNG
SLKAO@MAIL.NTOU.EDU.TW

Education: Dr.

Work Experience: Teaching assistant Of the DEPARTMENT OF TRANSPORTATION SCIENCE
Research Interests: Mobile communication, GIS, Electronic navigation, Intelligent transportation system

Professional Memberships / Awards:

Selected publications or research projects:

NILS B.KERPEN

Title:Dipl.-Ing.
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EDUCATION:

(2009)Diploma in Coastal Engineering, Leibniz University Hannover

WORK EXPERIENCE:

(2013–TODAY)LABORATORY MANAGER (FRANZIUS-INSTITUTE)2014 two month research exchange with IIT Madras, India

(2009–2013)RESEARCH ASSOCIATE (FRANZIUS-INSTITUTE)

RESEARCH INTERESTS:

Physical model tests, wave run-up and overtopping, instrumentation

PHD-Topic: Wave interaction with stepped revetments

PROFESSIONALMEMBERSHIPS/AWARDS:

Member of two local engineering societies (HTG, FI friend's association)

Winner of student research challenge awarded by HZG in 2009

SELECTED PUBLICATIONSOR RESEARCH PROJECTS:

Kerpen, N.B.; Schlurmann, T. (2016): Stepped Revetments -Revisited, Proc.6th Int.Conf.on the Application of Phys.Modelling in Coastal and Port Eng.and Science (Coastlab16), Ottawa, Canada.

Kerpen, N.B.,Goseberg, N.Schlurmann T. (2014): Experimental Investigations on Wave Overtopping on Stepped Embankments, Application of Phys.Modelling to Port and Coastal Protection, Proc. 5th Int. Conf. Coastlab14, Vol.1, Varna, Bulgaria, ISBN: 978-619-90271-1-0, pp. 262-269.

Kerpen, N.B., Schlurmann T. (2013): Scattering of the mean overtopping discharge along a crest at dykes with topped vertical wall, ICE Conferences - Coast, Marine

Structures and Breakwaters 2013, Edinburgh, United Kingdom.
Kerpen N.B., Schlurmann T.(2012): Wave overtopping at dykes with topped vertical wall -Impacts of oblique wave attack, Int. Conf. on Coastal Eng., Santander, Spain.
Kerpen N. B., Schlurmann T. (2012): Wave Overtopping at Vertical Walls and Dykes With Topped Vertical Walls, Proc.8thInt.Conf.onCoastal and Port Eng.in Developing Countries, Dep.of Ocean Eng., IITMadras, Chennai, India, pp. 1542-1549, ISBN: 978-93-80689-06-7.

CHUN-HAN KO

Ph.D. Student
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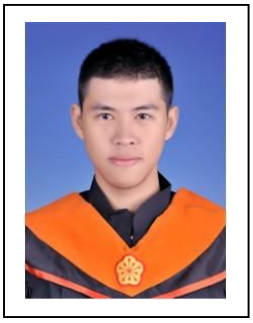

Education:

B.S. National Chung Hsing University(2006/9 ~ 2010/6)
M.S National Chung Hsing University(2010/9 ~ 2012/6)
PhD student National Chung Hsing University(2013/9 ~)
Ph.D. candidate(2015)

Work Experience:

Project assistant - Ministry of Science and Technology (2012/8~2012/10)
Project assistant - Ministry of Science and Technology (2013/1~2013/12)
Research Assistant - M.O.T.C(2014/1~2014/12)
Research Assistant - M.O.T.C(2015/1~2015/12)
Research Assistant - Water Resources Planning Institute (2015/3~2015/11)
Research Assistant - Ministry of Science and Technology(2015/12~2016/7)

Research Interests:

Ocean Engeering, Hydraulic Engineering, Hydrodynamic calculation, Natural Hazards, Coastal Protection

Selected publications or research projects:

1. Ko, C.H., Tsai, C.P. and Chen, Y.C., (2012) "Numerical Simulations on Waves between a Submerged Breakwater and a Seawall," Proc. 34th Ocean Eng. Conf. Taiwan, pp. 213-218。
2. Ko, C.H., Tsai, C.P. and Chen, Y.C., (2013) " Numerical Simulations on Waves between a Permeable Submerged Breakwater and a Sloping Seawall," Proc. 35th Ocean Eng. Conf. Taiwan, pp. 215-220。
3. Ko, C.H., Tsai, C.P. and Chen, Y.C., Sihombing, T.O., (2015) "Numerical Simulations of Wave and Flow Variations between Submerged Breakwaters and Slope Seawall" Proc. 25st Int. Offshore and Polar Eng. Conf., Kona, Hawaii, USA, pp. 1448-1453.
4. Ko, C.H. and Tsai, C.P., (2015) " Study on Berm Deformation Affected by Submerged Breakwater during Storm Wave," Proc. 37th Ocean Eng. Conf. Taiwan, pp. 219-324。

VERENA KREBS

Title: M.Sc. RWTH
Department: Institute of Hydraulic Engineering
Address: RWTH Aachen University
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EDUCATION:

Master of Science, Civil Engineering (Main Emphasis: Hydraulic engineering), RWTH Aachen University (2014)
Visiting Graduate Student at University of British Columbia, Vancouver (06 - 12/2013)
Bachelor of Science, Civil Engineering, RWTH Aachen University (2012)

WORK EXPERIENCE:

Research Associate at Institute of Hydraulic Engineering and Water Resources Management of RWTH Aachen University (since 06/2015)
Internship and Bachelor Thesis at Ramboll IMS Ingenieurgesellschaft, Hamburg (11/2011 – 04/2012)
Student Assistant at Institute of Hydraulic Engineering and Water Resources Management of RWTH Aachen University (2009 - 2013)

RESEARCH INTERESTS:

Coastal protection constructions, Geotextiles, Offshore Engineering

PROFESSIONAL MEMBERSHIPS / AWARDS:

Josef-Pirlet-Award of the Faculty of Civil Engineering, RWTH Aachen University (2013)

SELECTED PUBLICATIONS OR RESEARCH PROJECTS:

Krebs, V.; Uliczka, K.; Wöffler, T.; Schüttrumpf, H. (2015): Numerical simulation of long periodic waves. In: HTG-Congress 2015, 9th – 11th September, Bremen (in German).
Krebs, V.; Peters, K. (2013): Development of Design Criteria for the use of Geotextile Sandcontainers as Scour Protection for Offshore Foundations. In: 8th Congress on Geosynthetics of NAUE group, 24th and 25th January 2013, Hohe Düne, Rostock. - Naue, 2013, p./Art.: 211-227 (in German).

CHIEH-CHANG KUO

Master Student

Department of Hydraulic and Ocean Engineering,

National Cheng Kung University

Tainan

E-mail: etu4315@gmail.com

Education:

2015 B.S. in Department of Habor & River Engineering of National Taiwan Ocean University in Keelung

Work Experience:

2016 Intern in AECOM corporation

Research Interests:

Computational Fluid Dynamics

Professional Memberships / Awards:

None

Selected publications or research projects:

None

YUAN-JYH LAN

Title: Dr.; Assistant Researcher

Department: Research Center for Ocean Energy and Strategies, National Taiwan Ocean University

City: Keelung

E-mail: yjlan@mail.ntou.edu.tw

Education:

1993,09 - 2000,11	Ph. D., Department of Hydraulic and Ocean Engineering, National Cheng Kung University

Work Experience:

2012,08 ~ present	Assistant Researcher, Research Center for Ocean Energy and Strategies, National Taiwan Ocean University
2009,02 - 2012,07	Assistant Researcher, Department of Hydraulic and Ocean Engineering, National Cheng Kung University
2008,11 - 2009,01	Assistant Research Professor, Department of Hydraulic and Ocean Engineering, National Cheng Kung University
2004,08 - 2008,10	Assistant Professor, Hsing Kuo University of Management
2001,01 - 2004,07	Postdoctoral Fellow, Department of Hydraulic and Ocean Engineering, National Cheng Kung University

Research Interests:

1. Ocean and Coastal Engineering; 2. Analysis on Wave and structure interaction; 3. Theory of porous and elastic structure in water; 4. Numerical models of wave and tidal current; 5. Coastal development and disaster prevention and conservation.

Professional Memberships / Awards:

Selected publications or research projects:

Publications:

Lan, Yuan-Jyh, Hsu, Tai-Wen, and Liu, Yan-Rong (2014) "Mathematical Study on Wave Interaction with a Composite Poroelastic Submerged Breakwater," *Wave Motion*, Vol. 51, pp. 1055–1070.

Lan, Yuan-Jyh, and Hsu, Tai-Wen (2014) "Analytical Solution for Wave Interaction with a Stack-type Double-layer Composite Poroelastic Submerged Structure," *Applied Mathematical Sciences*, Vol. 8, No. 37, pp. 1799-1816.

Research Projects:

"Research on the Permeable Bed and Submerged Structure Effects of Wind Wave Model," 2015/08/01－2016/07/31, MOST104-2221-E-019-039.

"The Research for the Interaction of Waves Propagating over a Double-layer Composite Poroelastic Submerged Structure," 2012/08/01－2013/07/31, NSC101-2221-E-019-072.

JAW-FANG LEE

Title: Professor

Department: Hydraulic and Ocean Engineering,
National Cheng Kung University

City: Tainan

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Education:

Ph.D., Civil Engineering, Oregon State University
M.S., Hydraulic and Ocean Engineering, National Cheng Kung University
B.S., Hydraulic and Ocean Engineering, National Cheng Kung University

Work Experience:

PROFESSOR(1991~PRESENT) – HYDRAULIC AND OCEAN ENGINEERING,
NATIONAL CHENG KUNG UNIVERSITY
ASSOCIATE PROFESSOR (1987/08~1991/09) - HYDRAULIC AND OCEAN
ENGINEERING, NATIONAL CHENG KUNG UNIVERSITY
VISITING PROFESSOR (2000/07~2000/09) - CIVIL ENGINEERING, UNIVERSITY
OF QUEENSLAND
VISITING PROFESSOR (1992/09~1993/09) – DISASTER PREVENTION
RESEARCH INSTITUTE, KYOTO UNIVERSITY

Research Interests:

Wave generation Theory
Interaction between Waves and Floating Structure with Moorings
Interaction between Waves and Porous Structures
Interaction between Waves and Poro-Elastic Bed

Professional Memberships / Awards:

Selected publications or research projects:

TSUNG-LIN LEE

Title: Professor & President
Department: Department of Architecture,
China University of Science and Technology
City: Taipei
E-mail: tllee58@cc.cust.edu.tw

Education:

PhD, Civil Engineering, National Chung-Hsing University, Taichung

Work Experience:

Professor & Director, Department of Architecture, China University of Science and Technology, Taipei
Professor and Dean, College of Humanities and Recreation, Nan-Jeon University of Science and Technology, Tainan
Professor and Dean, College of Health Leisure, Leader University, Tainan

Research Interests:

Application of Artificial Neural Network,
Climate change for the sea level rise
Renewable energy- Application of Solar and Offshore Wind Energy

Professional Memberships / Awards:

2016:The International Association of Organizational Innovation, editor board
2016: The Open Journal of Marine Science journal, editorial board
2016: The open ocean engineering journal , editor board
2016: The open civil engineering journal , editor board
2016: Asian Journal of Information Technology, editor board
2016: CiVEJ Journal, editor board

Selected publications or research projects:

C.-C. Wen, **T.-L., Lee**, C.-L. Chen, Y.-J. Lin (**2013**). "The Feasibility and Effectiveness of Using Bragg Breakwaters in the Shoreline Wave Climate for East Taiwan Ocean Energy" The Open Civil Engineering Journal. Vol. 7, pp. 101-108.

T.-L., Lee, (**2010**). "Application of Fuzzy Analytic Hierarchy process to assess the potential of offshore wind energy in Taiwan" The Open Civil Engineering Journal. Vol. 4, pp. 96-104

T.-L. Lee, C.-P. Tsai, H. M. Lin and C. J. Fang, (**2009**). "A Combined Thermography Analysis-Neural Network Methodology for the Eroded Caves behind Seawall," Ocean Engineering. Vol. 36, No.15-16,

pp. 1251-1257
T.-L. Lee, **(2008)** "Prediction of the storm surge and surge deviation using neural network," Journal of Coastal Research, Vol. 24, No.4C, pp.76-82.

YU-CHEN LEE

Title: Master student

Department: Department of Hydraulic and Ocean Engineering, National Cheng Kung University

City: Tainan

E-mail:

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Education:

2011,09- 2015,09

Bachelor: Dept. of Hydraulic & Ocean Engineering, National Cheng Kung University

2015,09-

Master: Dept. of Hydraulic & Ocean Engineering, National Cheng Kung University

Research Interests:

1. Ocean and Coastal Engineering;
2. Ocean swell analysis
3. Freak wave analysis
4. Coastal flooding simulation and protection

Professional Memberships / Awards:

Selected publications or research projects:

Lee Y.C., Doong D.J., Tsai C.H., Tsai J.C., 2015: The Swell Generated Dangerous Wave in NE Taiwan Coasts. Proceedings of the 7th Workshop for Marine Environment and Energy, Keelung, Taiwan.

Name Hua Jun Li
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Nationality P. R. China
Current Position Professor & Vice President, Ocean University of China, Qingdao, China

EDUCATION

4/1997 - 3/2001	Ph.D. student at the Disaster Prevention Research Institute, Kyoto University, Japan
8/1983 - 7/1986	Graduate student at the Department of Naval Architecture, Dalian University of Technology, Dalian, China
9/1978 - 7/1982	Undergraduate student at the Department of Mechanical Engineering, Shandong University, Jinan, China.

Working Experience

12/2009 – Present	Vice President, Ocean University of China, Qingdao, China
2/1999 –12/2009	Dean, College of Engineering, Ocean University of China, Qingdao, China
4/1997 –3/2001	JSPS RONPAKU Fellow, Disaster Prevention Research Institute, Kyoto University, Japan
12/1997 –12/1998	Visiting Professor, Dept of Ocean Engineering, University of Rhode Island, USA
5/1995 –2/1999	Professor, Associate Dean, College of Engineering, Ocean University of Qingdao, Qingdao, China
7/1986 - 5/1995	Lecturer, Associate Professor, College of Engineering, Ocean University of Qingdao, Qingdao, China

Research Interests:

Offshore Structural Dynamics and Disaster Mitigation

Professional Honours, Awards and Fellowships

1. "Changjiang Honored Professorship", Oct. 2005
2. National Awards for Science and Technology, 2004.
3. National Awards for Science and Technology, 2010.

Selected publications:

Huajun Li, Ping Li, Sau-Lon James Hu, Modal parameter estimation for jacket-type platforms using noisy free-vibration data: Sea test study, Applied Ocean Research 37 (2012) 45– 53

Li, Huajun; Fang, H; Hu, SLJ,Damage localization and severity estimate for three-dimensional frame structures, JOURNAL OF SOUND AND VIBRATION, 301 (3-5): 481-494 APR 3 2007

Li, Huajun; Yang, HZ; Hu, SJ, Modal strain energy decomposition method for damage localization in 3D frame structures, JOURNAL OF ENGINEERING MECHANICS-ASCE, 132 (9): 941-951 SEP 2006

YING LI

Senior Engineer, Lecturer

Chinese-German Institute of Engineering

318 Liuhe Road, Hangzhou

liying@zust.edu.cn

Education:

PhD: Dalian University of Technology, 2011

BEng: Dalian University of Technology, 2005

Work Experience:

Lecturer, Zhejiang University of Science and Technology, since Sept. 2015

Senior Engineer, China United Engineering Corporation, since July 2015

Engineer, China United Engineering Corporation, July. 2011 – June 2015

Research Interests:

Coastal and estuarine disaster and prevention, Coastal and estuarine engineering

Professional Memberships / Awards:

None

Selected publications or research projects:

Li Ying, Gong Jinxin, Pushover analysis for seismic performance of pile-supported wharf structures. Journal of Ship Mechanics, 2011, 15(9): 1022-1032.

Li Ying, Gong Jinxin Modal response spectra seismic analyses for prestressed piled wharf structure. Journal of Dalian University of Technology, 2011, 51(6): 846-853.

Bin Wang, Ying Li, Na Lv, Binbin Zhu, Wei Li, Analysis of working condition and load direction for tripod substructure of offshore wind turbine. 2013 International Conference on Mechanical Engineering, Civil Engineering and Material Engineering, Hefei, China, 2013.10.26-27.

CHI-YU LI

Assistant Research Fellow
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Education:

Dr.-Ing.: Brandenburg University of Technology, 2014
MSc: EuroAquae, 2007
MSc: National Taiwan University, 2004

Work Experience:

Assistant Research Fellow, since Aug. 2015

Research Interests:

Numerical Analysis, Optimization Problems, Ocean Energy Harvesting

NAI-KUANG LIANG

Professor Emeritus
Institute of Oceanography, College of Science,
National Taiwan University
Taipei
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Education:

B. S., Hydraulic Enginneering, National Cheng Kung University, 1964

M. S., Hydraulic Engineering, National Cheng Kung University, 1967

Dr.-Ing., Wasserbau und Kuesteninginieurwesen, Technische Universität Hannover, Germany, 1973

Experience:

Director General, Institute of Harbor & Marine Technology, Department of Transportation,

Taiwan Provincial Government,1981-1989.

Director, Institute of Oceanography, College of Science, National Taiwan University, 1996-2002.

Research Interests:

Typhoon Wave Forecasting, Artificial Upwelling , Ocean Thermal Energy Conversion, Artificial Marine Forest

Professional memberships / Awards:

Member, Chinese Institute of Civil and Hydraulic Engineering

Member, Chinese Ocean & Underwater Technology Association

Member, The Taiwan Society of Ocean Engineering

Selected publications or research projects:

Lin S, Chen J, Liang N, et al. 2016. A Study on Wave-Induced Artificial Upwelling. Marine Technology Society Journal, 50(1): 48-55.

Nai-Kuang Liang(2012) The freak wave potential of typhoon swell, *Journal of marine science and technology,* vol. 20, no. 4, pp.467-471.

Liang ,Nai-Kuang, Guang-I Dai and Chien-Ju Hung (2010) A study on artificial marine forest, *Journal of Coastal and Ocean Engineering,* Vol. 10, No. 1, pp.121-142(in Chinese).

Liang, Nai-Kuang (2007) The freak wave mystery—A new hypothesis for its occurrence, *Journal of Marine Science and Technology*, Vol. 15, No. 3, pp. 241-246.

Liang, Nai-Kuang (2006) A reflection of pneumatic breakwater, *Journal of Coastal and Ocean Engineering*, Vol. 6, No. 1, pp. 85-99.

Liang, Nai-Kuang & Hai-Kuen Peng (2005) A study of air-lift artificial upwelling, *Ocean Engineering* 32 (2005) 731-745.

Liang, Nai-Kuang, Jen-Sheng Huang and Chih-fei Li (2004) A study of spar buoy floating breakwater, *Ocean Engineering* 31 (2004) 43-60.

Liang, N. K. (2003) The typhoon swell Doppler effect, *Ocean Engineering* 30 (2003) 1107-1115 .

Shin-Jye Liang

Professor
Department of Marine Environmental Informatics,
National Taiwan Ocean University
Keelung
sjliang@ntou.edu.tw

Education:

Shin-Jye Liang received the B.S. in Department of Hydraulic and Ocean engineering from National Cheng Kung University, Tainan, Taiwan, in 1983 and the M.S. degree in ocean engineering from University of Rhode Island, Kingston, RI, in 1988 and the Ph.D. degree in aerospace engineering from University of Florida, Gainesville, FL, in 1993.

Research Interests:

Computational fluid dynamics, wave modeling, and fluid-structure interactions.

Professional memberships / Awards:

Shin-Jye Liang has served as the Executive Editor of Journal of Marine Science and Technology from 2011 to 2013. He was a recipient of the Best Paper Award of the 27th Ocean Engineering Conference in Taiwan in October, 2005, and an outstanding research award of the National Taiwan Ocean University in May, 2014.

Selected publications or research projects:

1. Shih-Jen Huang, Chung-Ru Ho, Sheng-Lin Lin, and Shin-Jye Liang*, Spatial-Temporal Scales of Green Island Wake Due to Passing of Kuroshio, International Journal of Remote Sensing and Remote Sensing Letters, 2014.

2. Shin-Jye Liang, Chun-Yi Lin, Tai-Wen Hsu, Chung-Ru Ho*, and Ming-Huei Chang, Numerical Study of Vortex Characteristics near Green Island, Taiwan, Journal of Coastal Research, 29(6), 1436-1444, November, 2013.

3. T.-W. Hsu*, S.-J. Liang, B.-D. Young, and S.-H. Ou, Nonlinear run-ups of regular waves on sloping structures, Natural Hazards and Earth System Sciences, 12, 1-10, 2012.

4. Shin-Jye Liang* and Chiung-Yang Lan, and Ying-Chih Chen, Shallow Water Flow Modeling Using Space-Time Least-Squares Finite-Element Method, Journal of Marine Science and Technology, 20(5), 595-602, 2012.

BINGCHEN LIANG

Professor

College of Engineering

238 Songling Road, Qingdao

bingchenliang@aliyun.com

Education:

PhD: Ocean University of China, 2005

BEng: Ocean University of China, 2000

Work Experience:

Visiting Fellow, Korea Ocean Research and Development Institute, June. 2005, Sep. 2005.

Professor, Ocean University of China, since Jan. 2013

Associate professor, Ocean University of China, Jan. 2008 – Dec. 2012

Lecturer, Ocean University of China, Sept. 2005 – Dec. 2007

Research Interests:

Coastal and estuarine disaster and prevention, Coastal and estuarine engineering

Professional Memberships / Awards:

Key Technology and Applications of Safety and Disaster Prevention for Ocean Engineering. Second Prize of National Award for Progress in Science and Technology, 2010

Selected publications or research projects:

Bingchen Liang, Xin Liu, Huajun Li, Yajie Wu, and Dongyong Lee. Wave Climate Hindcasts for the Bohai Sea, Yellow Sea, and East China Sea. Journal of Coastal Research, 2016.1, 32(1):172-180.

Bingchen Liang, Guoxiang Wu, Fushun Liu, Hairong Fan, Huajun Li. Numerical study of wave transmission over double submerged breakwaters using non-hydrostatic wave model. Oceanologia, October–December 2015, 57, 308-317.

Bingchen LIANG, Fei FAN, Zegao YIN, Hongda SHI, Dongyong LEE. Numerical Modelling of the Nearshore Wave Energy Resources of Shandong Peninsula, China. Renewable Energy, 2013.3, 57:330-338.

MIKE LIESKE

Title: Dipl.-Ing.

Department: Franzius-Institute for Hydraulic, Estuarine and Coastal Engineering

Address: Leibniz Universität Hannover

E-mail: Lieske@fi.uni-hannover.de

Education:

Diploma in Civil Engineering, Technische Universität Braunschweig, Germany (2010)

Work Experience:

Research associate, Leibniz Universität Hannover (since 2014)

Research associate & Teaching Assistant, Technische Universität Braunschweig (2010-2013)

Research Interests:

Wave-Current Interaction; Physical modeling of hydrodynamics in a 3D-wave basin; Measurement, analysis and assessment of hydrodynamic data

Professional Memberships / Awards:

Hafentechnische Gesellschaft e.V. (German Port Technology Association)

Selected publications or research projects:

KFKI research project "Seegangsbelastungen (Seele)" (Contract No. 03KIS107) by the German "Federal Ministry of Education and Research (BMBF)" and "Kuratorium für Forschung im Küsteningenieurwesen (KFKI)"

HAIJIANG LIU

Professor

College of Civil Engineering and Architecture

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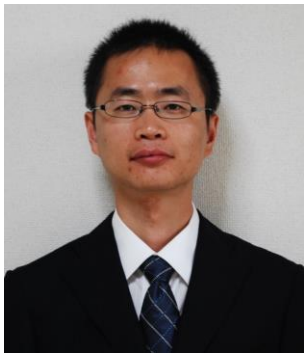

Education:

PhD: The University of Tokyo, 2005

MEng: Shanghai Jiao Tong University, 2002

BEng: Shanghai Jiao Tong University, 2000

Work Experience:

Professor, Zhejiang University, Sep. 2012 - present

Associate professor, the University of Tokyo, Jul. 2010 – Sep. 2012

Project research associate, the University of Tokyo, Nov. 2006 – Jul. 2010

Visiting scholar, the University of Sydney, Nov. 2005 – Oct. 2006

Research Interests:

Coastal engineering

Professional Memberships / Awards:

Editor of *Coastal Engineering Journal*, Guest Editor of *Journal of Disaster Research*, ISC member of APAC conference, External PhD examiner of the University of Queensland;

The Recruitment Program of Global Youth Experts, China; JAMSTEC Award, Japan

Selected publications or research projects:

Deng, X., Liu, H., Jiang, Z., Baldock, T. (2016). Swash flow properties with bottom resistance based on the method of characteristics. Coastal Engineering, 114, 25-34.

Cheng, Z., Liu, H. (2015). Digital grain size analysis based on autocorrelation algorithm. Sedimentary Geology, 327, 21-31.

Liu, H., Takagawa, T., Sato, S. (2014). Sand Transport and Sedimentary Feature based on Feldspar Thermoluminescence: A Synthesis of the Tenryu-Enshunada Fluvial System, Japan. Journal of Coastal Research, 30(1), 120-129.

HUI LIU

Graduate Student

Ocean College

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Education:

BEng: North China Electric Power University, 2014

Work Experience:

None

Research Interests:

Tsunami, Dam-break wave

Professional Memberships / Awards:

None

Selected publications or research projects:

Hui Liu, Liheng Guo, Kang He, Xiaohu Deng, Haijiang Liu. An Experiment Study on the Dam-break Hydrodynamic Characteristics. The 8th South China Sea Tsunami Workshop (Changsha, China), 2015.

Hui Liu, Haijiang Liu. Experimental Study on the Dam-break Hydrodynamic Characteristics under Different Conditions. Journal of Coastal Research, submitted.

YONG LIU

Title: Professor

Department: Department of Ocean Engineering, College of Engineering, Ocean University of China

Address: No. 238 Songling Road, Qingdao

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Education:

2002.9 – 2007.10, Dalian University of Technology, Ph.D. in Port, Coastal and offshore Engineering

1995.9 – 1999.7, Dalian University of Technology, Eng. B. in Port Channel and River Management Engineering

Work Experience:

2014.01 – Now, Professor, College of Engineering, Ocean University of China

2011.01 – 2013.12, Associate Professor, College of Engineering, Ocean University of China

2007.10 – 2010.12, Lecturer, College of Engineering, Ocean University of China

Research Interests:

Wave interaction with coastal and ocean structures

Selected publications or research projects:

Liu Yong, Li Hua-jun, Zhu Lei. Bragg reflection of water waves by multiple submerged semi-circular breakwaters. Applied Ocean Research, 2016, 56: 67–78.

Liu Yong, Li Yu-cheng. Predictive formulas in terms of Keulegan-Carpenter numbers for the resistance coefficients of perforated walls in Jarlan-type caissons. Ocean Engineering, 2016, 114: 101–114.

Liu Yong, Faraci Carla. Analysis of orthogonal wave reflection by a caisson with open front chamber filled with sloping rubble mound. Coastal Engineering, 2014, 91: 151–163.

Liu Yong, Li Hua-jun. A new semi-analytical solution for gap resonance between twin rectangular boxes. Proc IMechE Part M: Journal of Engineering for the Maritime Environment, 2014, 228(1): 3–16.

Liu Yong, Li Hua-jun. Analysis of wave performance through pile-rock breakwaters. Proc IMechE Part M: Journal of Engineering for the Maritime Environment, 2014, 228(3): 284–292.

ZHEN LIU

Professor
College of Engineering
238 Songling Road,
Qingdao
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Education:

2002.09 – 2008.07	–	Ocean University of China, Ph.D. in Harbour, Coastal and Offshore Engineering
2006.03 – 2008.06	–	Korea Maritime and Ocean University, Exchange Student in Naval Architecture and Ocean Systems Engineering
1998.09 – 2002.07	–	Ocean University of China, B.E. in Harbour, Channel and Coastal Engineering

Work Experience:

2016.01 – now		Professor of Marine Engineering, Ocean University of China
2011.01 – 2015.12	–	Associate Professor of Marine Engineering, Ocean University of China
2008.07– 2010.12		Lecturer of Harbour, Channel and Coastal Engineering, Ocean University of China
2008.07 – 2008.12	–	Visiting Scholar in Naval Architecture and Ocean Systems Engineering, Korea Maritime and Ocean University

Research Interests:

- Development and Utilization of Marine Renewable Energy
- Computational Fluid Dynamics and Numerical Simulation
- Physical and Numerical Experiment on Offshore and Coastal Engineering

Professional Memberships / Awards:

- Shandong Province Science Fund for Distinguished Young Scholars, 2013.

Selected publications or research projects:

- **Zhen Liu***, Ying Cui, Kil. W. Kim, Hongda Shi. Numerical Study on a Modified Impulse Turbine for OWC Wave Energy Conversion, Ocean Engineering, 2016, 111(1): 533-542
- **Zhen Liu***, Ying Cui, Huanyu Zhao, Hongda Shi. Effects of Damping Plate and Taut Line System on Mooring Stability of Small Wave energy Converter. Mathematical Problems in Engineering, 2015, Article ID 814095, 12 pages
- **Ying Cui**, Zhen Liu*, Beom-Soo Hyun. Pneumatic Performance of Staggered Impulse Turbine for OWC Wave Energy Convertor. Journal of Thermal Science, 2015, 24(5): 1-7
- **Ying Cui**, Zhen Liu*. Effects of Solidity Ratio on Performance of OWC Impulse Turbine, Advances in Mechanical Engineering, 2015, 7(1): 1-10

MENG LIU

Postgraduate Student

College of Engineering

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Education:

BEng: Ocean University of China, Naval Architecture and Marine Engineering, 2016.

Research Interests:

Dynamic properties analysis of offshore structures;

Optimum design and multi-criteria decision making of supporting structures for offshore wind turbines (OWTs);

Selected publications or research projects:

Xun Meng, Xiaohan Liu, Huiyuan Tian, Meng Liu, Changzhi Wu. Optimal design and experimental evaluation of a TLP for FOWT at moderate water depth, Proceedings of the Twenty-sixth (2016) International Ocean and Polar Engineering Conference, Rhodes, Greece, June 26-July 1, 2016: 296-302.

XUFEI LIU

Research associate

Tianjin Research Institute for Water Transport Engineering, M.O.T.

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Education:

PhD: Tianjin University, 2015

BEng: Tianjin University, 2010

Work Experience:

Research associate, Tianjin Research Institute for Water Transport Engineering, M.O.T., since July, 2015

Research Interests:

Slope stability, Interaction between structure and soil

Selected publications or research projects:

Yuanzhan Wang, Xufei Liu, Analysis on Slope Stability Considering Seepage Effect on Effective Stress. KSCE Journal of Civil Engineering, 2016.9, 20(6).

Yuanzhan Wang, Xufei Liu, Zhikai Zhang, et al. Experimental Research on Influence of Root Content on Strength of Undisturbed and Remolded Grassroots-reinforced Soil. Chinese Journal of Geotechnical Engineering, 2015.8, 37(8), 1405-1410.

Tianjin Natural Science Foundation (Grant No. 16JCQNJC07300), Research on Stability of Pit Support Engineering with Seepage Damage on Clay Skeleton.

CHUN-HAN LO

Title: Master Student

Department: Hydraulic and Ocean Engineering,

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Education:

B.S. Hydraulic and Ocean Engineering, National Cheng Kung University, 2015

Graduate Student, Hydraulic and Ocean Engineering, National Cheng Kung University, (2015~present)

Work Experience:

Research Interests:

Wave interaction with floating structures

Professional Memberships / Awards:

Selected publications or research projects:

LIN LV

Title: Associate Professor

Department: Center for Deepwater Engineering, Dalian University of Technology

Address: State Key Laboratory of Coastal and Offshore Engineering, Dalian University of Technology, Dalian 116024, China

E-mail: LuLin@dlut.edu.cn

Education:

PhD, 9/2002-10/2006, Port, Coastal and Offshore Engineering, Dalian University of Technology

Master, 9/1999-7/2002, Marine Geology, Ocean University of China

Bachelor, 9/1995-7/1999, Hydrogeology and Geotechnical Engineering, Ocean University of China

Professional Career:

Associate Professor, 11/2011-, Center for Deepwater Engineering, Dalian University of Technology

Lecturer, 10/2008-11/2011, Center for Deepwater Engineering, Dalian University of Technology

Post-Doc, 10/2006-10/2008, Department of Mechanical Engineering, Dalian University of Technology

Research Fellow, 3/2007-4/2008, School of Civil and Resource Engineering, The University of Western Australia, Australia

Visiting Scholar, 5/2011-5/2012, Research Department of Marine Division, Bureau Veritas, France

Research Interests:

My research work aims at numerical and experimental investigations of fluid and structure interactions in ocean engineering. The numerical simulations involve both potential and viscous flow theories. At present, I am focused on the nonlinear coupling between water waves and floating bodies in proximity, vortex-induced vibration of multiple cylindrical structures, sediment transport and granular flows, stability of subsea structures, and FEM-based numerical modeling of nonlinear waves.

Selected publications:

1. **Lu**, **L**., Jiang, S., Zhao M., et al., 2015. Two-dimensional viscous numerical simulation of liquid sloshing in rectangular tank with/without baffles and comparison with potential flow solutions. Ocean Engineering, 108: 662-677.
2. **Lu**, **L**., Liu, M.M., Teng, B., et al., 2014. Numerical investigation of fluid flow past circular cylinder with multiple control rods at low Reynolds number. Journal of Fluids and Structures, 48: 235-259.
3. **Lu**, **L**., Qin, J.M., Teng, B., et al., 2011. Numerical investigations of lift suppression by feedback rotary oscillation of circular cylinder at low Reynolds number. Physics of Fluids, 23(3), 03361.
4. **Lu**, **L**., Teng, B., Cheng, L., et al., 2011. Modelling of multi-bodies in close proximity under water waves-fluid resonance in narrow gaps. Science China Physics, Mechanics & Astronomy 54, 16-25.
5. **Lu**, **L**., Teng, B., Sun, L., et al., 2011. Modelling of multi-bodies in close proximity under

water waves - fluid forces on floating bodies. Ocean Engineering, 38 (13): 1403-1416.

Projects Undertaking

1. **Natural Science Foundation of China**, 'Physical mechanism and analysis method of near-trapping in structures with complex configuration under water waves', 1/2015~12/2019.
2. **Natural Science Foundation of China**, 'Potential flow theory of viscous fluids and interaction of water waves with multiple floating structures in close proximity', 1/2013~12/2016.

Dr. Sunwei, Li

Assistant Professor
Division of Ocean Science and Technology,
Graduate School at Shenzhen,
Tsinghua University

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Education

2008.9-2012.4 — **PhD**
Civil and Environmental Engineering — University of Western Ontario, London, Canada

2005.9-2008.7 — **M. E.**
Wind Engineering — Tongji University, Shanghai, P. R. China

2001.9-2005.7 — **B. E.**
Civil Engineering — Tsinghua University, Beijing, P. R. China

Working Experience

2014.1-present — **Assistant Professor**

Division of Ocean Science and Technology,
Graduate School at Shenzhen, Tsinghua University

2013.9-2014.12 — **Visiting Scholar**

CLP Wind/Wave Tunnel Facility,
Hong Kong University of Science and Technology

2012.7-2013.8 — **Post-doc fellow**

Department of Civil and Environmental Engineering,
Hong Kong University of Science and Technology

2008.9-2012.3 — **Research Assistant**

Department of Civil and Environmental Engineering,
University of Western Ontario

Awards

2007 — Second-class Academic Outstanding Scholarship,
Tsinghua University, Beijing, China

2008-2012 — Oversee Scholarship for Chinese citizen,
Chinese Scholarship Council, Beijing, China

2010 — Thesis Research Award
University of Western Ontario, London, Canada

XIAOZHOU MA

Title: Associate Professor

Department: The State Key Laboratory of Coastal and Offshore Engineering Dalian University of Technology

Address: The State Key Lab of Coastal & Offshore Eng., Dalian Univ. of Tech., Dalian, China, 116024.

E-mail: maxzh@dlut.edu.cn

Education:

Ph.D. Dalian University of Technology, Coastal Engineering, 2006

B.S. Wuhan University of Hydraulic and Electrical Engineering, Hydraulic Engineering, 1996

Work Experience:

2013.12- 2014.11 Visiting Scholar, University of Michigan

2010- Associate Professor, Dalian University of Technology

2008-2010 Lecturer, Dalian University of Technology

2006-2008 Post Doctor, Dalian University of Technology

Research Interests:

Coastal waves: Theory, Numerical & physical modeling

Infragravity waves: Theory, Modeling

Harbor seiche: Theory, Modeling

Freak waves: In-situ measurement, theory and modeling

Selected publications:

Ma, Y., Ma, Xiaozhou, Perlin, M. and Dong, G., 2013. Extreme waves generated by modulational instability on adverse currents. Physics of Fluids, 25(11)

Dong, G.H., Ma, X.Z., Perlin, M., Ma, Y.X., Yu, B. and Wang, G., 2009. Experimental study of long wave generation on sloping bottoms. Coastal Engineering, 56(1): 82-89.

Dong, G.H., Ma, X.Z. and Teng, B., 2008. One-dimensional horizontal Boussinesq model enhanced for non-breaking and breaking waves. China Ocean Engineering, 22(1): 31-42.

Dong, G.H., Ma, X.Z. and Teng, B., 2009. Numerical modeling of surf beat generated by moving breakpoint. Science in China Series E-Technological Sciences, 52(2): 392-399.

Dong, G.H., Ma, X.Z., Xu, J.W., Ma, Y.X. and Wang, G., 2009c. Experimental study of the transformation of bound long waves over a mild slope with ambient currents. Coastal Engineering, 56(10): 1035-1042.

YUXIANG MA

Title: Professor

Department: The State Key Laboratory of Coastal and Offshore Engineering Dalian University of Technology

Address: The State Key Lab of Coastal & Offshore Eng., Dalian Univ. of Tech., Dalian, China, 116024.

E-mail: yuxma@dlut.edu.cn

ducation:

2000-2004: University of South China, BE in Civil Engineering

2004-2010: Dalian University of Technology, PhD in Coastal Engineering

Work Experience:

2014-present	Professor, Dalian University of Technology
2013-2014	Associate Professor, Dalian University of Technology
2010-2013	Lecturer, Dalian University of Technology
2010-2012	Post Doctor, Dalian University of Technology

Research Interests:

Physical and numerical modeling nonlinear waves; Data analysis; CFD; Flow visualization

Professional memberships / Awards:

Scholarship of Bureau Veritas 2008

The Second-class Ministry of education of Natural Science Award 2009

Scholarship for excellent doctor candidate of Dalian University of Technology 2009

National Excellent Doctoral Dissertation of PR China 2012

Selected publications or research projects:

6. **Yuxiang Ma**, Guohai Dong, Marc, Perlin, Xiaozhou Ma, Gang Wang, Jianwu Xu. Laboratory observations of wave evolution, modulation and blocking due to spatially varying opposing currents. Journal of Fluid Mechanics, 2010, 661, 108-129.
7. **Yuxiang Ma**, Guohai Dong, Marc Perlin, Xiaozhou Ma, Gang Wang, Experimental investigation on the evolution of the modulation instability with dissipation. Journal of Fluid Mechanics, 2012. 711: 101-121.
8. **Yuxiang Ma**, Xiaozhou Ma, Marc Perlin, Guohai Dong, Extreme waves generated by modulational instability on adverse currents， Physics of Fluids, 2013.25:114109.
9. Dianyong Liu, **Yuxiang Ma**, Guohai Dong, and Marc Perlin,, 2015. An experimental study of weakly three-dimensional non-breaking and breaking waves. European Journal of Mechanics B/Fluids, 52, 206-216.

XUN MENG

Associate Professor

College of Engineering

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Education:

PhD: Ocean University of China, Coastal and Offshore Engineering, 2010.

BEng: Qingdao Technological University, Applied Mechanics, 1999.

Work Experience:

Associate professor, Ocean University of China, Jan. 2015

Lecturer, Ocean University of China, Jan. 2001 – Jan. 2015

Visiting Scholar, Curtin University, West Australia, Building Information System (BIM) of offshore structures, Aug. 2015 – Aug. 2016

Post-doctorates mobility of TANDEM Alliance program, ERASMUS, Universidad Politécnica de Madrid (UPM), Madrid, Spain. Fiber-metal hybrid laminates used on offshore structures. Aug. 2010- Aug.2011

Visiting Scholar, University of California, San Diego (UCSD), California, USA. Teaching Sciences in English-Faculty Development Program, CSC. Mar. 2005-Sep. 2005:

Research Interests:

Dynamic properties analysis of offshore structures;

Optimum design and multi-criteria decision making of supporting structures for offshore wind turbines (OWTs);

Dynamic coupling analysis and failure mechanism study on large scale floating structures at deep sea

Selected publications or research projects:

Xun Meng, Xiaohan Liu, Huiyuan Tian, Meng Liu, Changzhi Wu. Optimal design and experimental evaluation of a TLP for FOWT at moderate water depth, Proceedings of the Twenty-sixth (2016) International Ocean and Polar Engineering Conference, Rhodes, Greece, June 26-July 1, 2016: 296-302.

Meng Xun, Shi Ruifeng. Multi-criteria assessment of offshore wind turbine support structures based on dynamic property optimization, High Technology Letters, 2014, 20(4):421-428.

Meng Xun, S.de Guzman,M.A.Herreros, I.Diez de Ulzur. Materiales híbridos estructurales fibra-metal para aerogeneradores offshore,The Spanish Conference in Composite Materials at Gerona,2011.08.13-2011.08.15.

NAME DE ZHI NING

Title: Professor

Department: The State Key Laboratory of Coastal and Offshore Engineering Dalian University of Technology

Address: The State Key Lab of Coastal & Offshore Eng., Dalian Univ. of Tech., Dalian, China, 116024.

E-mail: dzning@dlut.edu.cn

Education:

2002-2005, Dalian University of Technology, PhD in Coastal and Offshore Engineering.

1999-2002, Liaoning Technical University, Master program in Two-Phase Flow.

1995-1999, Liaoning Technical University, Bachelor program in Mining Engineering.

Work Experience:

Dec. 2014—Present, Professor, Dalian University of Technology.

Dec. 2009—Dec.2014, Associate Professor, Dalian University of Technology

Aug. 2005—Dec.2009, Lecture, Dalian University of Technology

Dec.2005—Jun.2007, Postdoctor, Department of Engineering Science, Oxford University, UK

Research Interests:

Wave nonlinearities and its interaction with structure; Wave and current interactions; Freak waves; Wave energy technology.

Professional Memberships / Awards:

Offshore Mechanics Scholarship of International Society of Offshore and Polar Engineering 2005

The First-Class of Qian Lingxi Yung Teacher Mechanics Award 2009

The First-Class of Ocean Engineering Technical Award 2015

Membership of International Society of Offshore and Polar Engineering 2015.

Selected publications or research projects:

[1]. **Ning De-zhi,** Wang RQ, Zou QP, Teng B. An experimental investigation of hydrodynamics of a fixed OWC Wave Energy Converter. ***Applied Energy***. 2016, 168:636-648.

[2] **Ning De-zhi**, Su XJ, Zhao M, Teng B. Numerical study of resonance induced by wave action on multiple rectangular boxes with narrow gaps. ***Acta Oceanologica Sinica***. 2015, 34(5):92-102.

[3] **Ning De-zhi**, Su XJ, Zhao M, Teng B.Hydrodynamic Difference of Rectangular-Box Systems with and without Narrow Gaps. ***Journal of Engineering Mechanics- ASCE***. 2015, 141(8): 04015023.

SHAN-HWEI OU

Title: Professor Emeritus

Department: Hydraulic and Ocean Engineering, National Cheng Kung University

City: TAINAN

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Education:

Dept. of Civil Engineering, National Cheng Kung University, Taiwan (Ph. D. 1977; M.S. 1971; B.S.1968)

Work Experience:

President and Professor, Tajen University, Taiwan（2006-2012）
Vice President, National Cheng Kung University, Taiwan（2001-2006）
Dean, College of Engineering, National Cheng Kung University, Taiwan（1993-1999）
Chairman, Dept. of Hydr.& Ocean Eng., NCKU, Taiwan（1986-1992）
Board Mem., Internatl Network for Eng. Education and Research,（since2006）
Member, Public Construction Commission, Executive Yuan, ROC（2005-2009）
President, Acad.-Indu. Consortium for Pingtung Agri. Biotech. Park（2008-2012）
President, Acad.-Indu. Consortium for Southern Taiwan Science Park（2005-2007）
President, Society of Theoretical and Applied Mechanics, Taiwan（2004-2006）
President, Kaohsiung Chapter, Institute of Chinese Engineers （2005-2007）
Secr. Gen., Presidents' Forum of Southeast and Taiwan Universities（2004-2006）
Professor, Associate Professor, Lecturer, NCKU, Taiwan （1974-2006）

Research Interests:

Wind waves model
Coastal management

Selected publications :

6. Hsu, T.-W.*, C.-M. Hsieh, C.-Y. Tsai, and S.-H. Ou (2015). Numerical simulation for wave breaking on bar/step-type beach profile. J. Coastal Research. Vol.31, No.2, pp. 417-427.

7. Hsu, T.-W.*, J.-F. Lin, S.-C. Hsiao, S.-H. Ou, A. V. Babanin, Y.-T. Wu (2014). Wave reflection and vortex evolution in Bragg scattering in real fluids. Ocean Eng. Vol. 88, pp. 508-519.
8. Hsu, T.-W.*, S.-Y. Liang, B.-D. Young and S.-H. Ou (2012). Nonlinear run-ups of regular waves on sloping structures. Nat. Hazards Earth Syst. Sci., Vol. 12, pp. 3811-3820.
9. Babanin, A.V., T.-W. Hsu*, A. Roland, S.-H. Ou, D.-J. Doong and Y.-M. Fan (2011). Spectral wave modelling of typhoon krosa. Nat. Hazards Earth Syst. Sci., Vol. 11, pp. 501-511.

Nianxin Ren (任年鑫)

➢ PERSONAL INFORMATION

Name: Nianxin Ren
Date of Birth: Aug 22, 1983
Gender: Male
Major: Engineering Mechanics
Citizenship: P.R. China
Address: School of Civil & Hydraulic Engineering
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Building #4, 306 room,
Mobile: 86-13591814468
Dalian University of Technology, Dalian, Liaoning, China
Email: rennianxin@dlut.edu.cn;

➢ EDUCATION BACKGROUND

- Sept., 2005~Nov., 2011: Doctorate in **Engineering Mechanics** (Successive postgraduate and doctoral programs)
  School of Civil Engineering, Harbin Institute of Technology, supervisor: Prof. **Jinping Ou**
  Title of doctoral dissertation: **Offshore wind turbine aerodynamic performance analysis and novel floating system**
- Sept., 2001~June, 2005: Bachelor Degree in Engineering Mechanics, **School of Civil Engineering, Wuhan University**

➢ WORK EXPERIENCE

- Feb. 2012~present: Lecturer at **Deepwater Engineering Research Center, *Dalian University of Technology***
- May. 2013~Feb. 2015: Postdoctor at Center for Ship and Ocean Structure (CeSOS), Norwegian University of Science and Technology, co-supervisor: Prof. Torgeir Moan and Prof. Zhen Gao.
- Feb. 2012~Feb. 2014: Postdoctor at Deepwater Engineering Research Center, Dalian University of Technology, co-supervisor: Prof. Jinping Ou.

➢ RESEARCH INTERESTS

- **Offshore wind turbine system**
- **Coupled aerodynamic and hydrodynamic analysis of floating offshore wind turbine system**
- **Combined wind turbine and wave energy device system**

➢ MAIN JOURNAL PUBLICATION (Totally more than 20 papers)

- **Nianxin Ren**, Zhen Gao, Torgeir Moan, Ling Wan. Long-term performance estimation of the Spar-Torus-Combination (STC) system with different survival modes. Ocean Engineering, 2015, 108: 716-728.(SCI)
- **Nianxin Ren**, Yugang Li and Jinping Ou. Coupled wind-wave time domain analysis of floating offshore wind turbine based on Computational Fluid Dynamics method, Journal of Renewable and Sustainable Energy, 2014, 6(2), 106-118. (SCI)
- **Nianxin Ren**, Yugang Li and Jinping Ou. The Effect of Additional Mooring Chains on the Motion Performance of a Floating Wind Turbine with a Tension Leg Platform. Energies, 2012, 5(4):1125-1149. (SCI)
- **Nianxin Ren**, Yugang Li and Jinping Ou. The wind-wave tunnel test of a TLP type floating wind turbine. Journal of Renewable and Sustainable energy, 2012, 4(6): 299-312. (SCI)
- **Nianxin Ren** and Jinping Ou. A crashworthy device against ship-OWT collision and its protection effects on the tower of offshore wind farms. China Ocean Engineering, 2009, 23(4), pp: 1-10. (SCI).

➢ SOCIAL ACTIVITIES

- International Offshore and Polar Engineering member
- International Conference on Ocean, Offshore and Arctic Engineering member
- Reviewer for Ocean Engineering, Journal of Renewable and Sustainable Energy, et al.

NAME RUI HE

Title: Dr.

Department: ***College of Harbor, Coastal and Offshore Engineering***

Address: 1st, Xikang Road, Nanjing

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Education:

2013-2014, joint PhD, engineering, University of Colorado, Boulder

2009-2014, PhD, Geotechnical engineering, Zhejiang University

2005-2009, BE, Civil engineering, Huazhong University of Science and Technology

Work Experience:

2014-present, lecture, Hohai University

Research Interests:

Offshore wind turbines, soil-structure dynamic interaction, piles

Professional Memberships / Awards:

Selected publications or research projects:

He R, Wang LZ, Yu HY. Time harmonic point load and dynamic contact problem of contacting fluid and poroelastic half-spaces, Soil Dynamics and Earthquake Engineering 36 (2012) 20-31.

He R, Wang LZ. A coupled fluid layer–rigid disk–poroelastic half-space vibration problem, Soil Dynamics and Earthquake Engineering 43 (2012) 114-123.

He R, Wang LZ. Horizontal vibration of a rigid disk buried in a poroelastic half-space in contact with a fluid half-space, Soil Dynamics and Earthquake Engineering 44 (2013) 38-41.

He, R and Wang, L, 2016. Elastic rocking vibration of an offshore Gravity Base Foundation. Applied Ocean. Research, 55, 48-58.

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Education and Professional Background:

Dipl.-Ing.,	Nov. 1995,	Bergische Universität Wuppertal
Dr.-Ing.,	Jun. 1999,	Bergische Universität Wuppertal
PD Dr.-Ing. habil,	May 2005,	Bergische Universität Wuppertal
Senior Researcher,	Jun. 2005,	United Nations University
Univ.-Prof. Dr.-Ing.,	Mar. 2007,	Leibniz Universität Hannover

Research Interests:

Coastal Engineering, Coastal Erosion, Flood and Integrated Coastal Zone Management, Coastal Disaster Risk & Vulnerability Assessments, Offshore Wind Energy Systems, Marine Environments & Impacts, Port & Harbor Design and Remediation, Marine Energy Systems

Professional memberships / Awards:

Member Scientific Board of Federal Waterways Engineering and Research Institute (BAW)

Member Scientific Board of the Helmholtz-Zentrum Geesthacht (HZG)

Member Executive Board of the German Port Technology Association (HTG)

Managing Director Coastal Research Centre (FZK) as Central Joint Research Institution of the Leibniz Univ. Hannover and Technical Univ. Braunschweig

Vice Dean Faculty of Civil Engineering and Geodetic Sciences, Leibniz Universität Hannover

Selected publications or research projects:

[13] Schendel, A., Goseberg, N., Schlurmann, T., 2016. Erosion stability of wide-graded quarry-stone material under unidirectional current. *Journal of Waterway, Port, Coastal and Ocean Engineering*, ASCE, 142 (3), art. no. 04015023

[14] Sriram, V., Ma, Q.W., Schlurmann, T., 2014. A hybrid method for modelling two dimensional non-breaking and breaking waves, *Journal of Computational Physics*, 272, pp. 429-454

[15] Goseberg, N., Wurpts, A. and T. Schlurmann (2013). Laboratory-scale generation of tsunami and long waves. *Coastal Engineering*, Vol. 79, pp. 57-74

[16] Zorndt, A.C., Wurpts, A., Schlurmann, T. (2011). The influence of hydrodynamic boundary conditions on characteristics, migration, and associated sand transport of sand dunes in a tidal environment - A long-term study of the Elbe Estuary. *Ocean Dynamics*, pp. 1-16

Escher, J. and T. Schlurmann (2008). On the Recovery of the Free Surface from the Pressure within Periodic Travelling Water Waves. *J. of Nonlinear Math. Physics*, Vol. 15, 2, pp. 50-57

BING SHI

Title: Prof.

Department: Ocean engineering

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Education:

1995-1998 Ph.D., Sichuan University, Chengdu, China.
1988-1991 M.Sc., Lanzhou Jiaotong University, Lanzhou, China.
1980-1984 B.Sc., Lanzhou Jiaotong University, Lanzhou, China

Work Experience:

Dec 2002-Present, Prof. Ocean University of China

January 1999-Associate professor, Ocean University og China

Nov.2000-junuary 2001,Visiting scholar, Clarkson University in USA.

June 1995-Aug. 1995 Associate professor, Lanzhou Jiaotong University

Research Interests:

Bing's research interests cover a wide range in Hydraulics and River Dynamics and Ocean Engineering. The main research areas include sediment transport and hydraulics of open channel,vegetation resistance and its effect on flow and river adjustment, ice dynamics and numerical simulation, ecological and environmental water demands, and submarine pipeline scour and protecting technique.

Selected publications or research projects:

1. SHI Bing ,CAO Shuyou et al, Vectorial Bedload Equations and River Width Dynamic Adjustment Modeling, J. of Sichuan University,Vol.37 ,2005, pp124-127.
2. Shi Bing, Wang Chuanyuan, Yin Ze-gao, Zhao Lin, Roughness coefficient relation of open channel with flexible submerged vegetation, Proceedings of the 16th IAHR-APD Congress and 3rd Symposium of IAHR-ISHS, Tsinghua University Press,Oct.20-23,2008, Nanjing, China, pp639-642.
3. HAN Yan, SHI Bing*, REN Xingyue, and JING Xiaodong, Experimental Study on the

Distribution of Velocity and Pressure near a Submarine Pipeline, J. Ocean Univ. China, 2009, Vol.8, No.4: pp404-408.

4. Lipeng YANG,Bing SHI, Yan HAN, A Study of sediment on Seabed with Submarine pipeline, Proceedings of the Twentieth (2010) International Offshore and polar Engineering Conference(ISOPE), Beijing China, June 20-26,2010 *ISBN* 978-1-880653-77-7 (Set); ISSN 1098-6189 (Set),Vol.2, pp98-103.
5. Yan HAN, Bing SHI, Lipeng YANG，Experimental study on the Function of Flexible Spoilers in Protecting Submarine Pipeline, Proceedings of the Twentieth (2010) International Offshore and polar Engineering Conference(ISOPE), Beijing China, June 20-26,2010, *ISBN 978-1-880653-77-7 (Set); ISSN 1098-6189 (Set)*, Vol.2, pp234-239.
6. Lipeng Yang, Bing Shi, Feifei Fan, Yong Liu, Experimental Study on Scouring for Horizontal Submarine Pipeline under Wave Condition, Conference on Modern Hydraulic Engineering(CMHE), 27-28, November 2010, Xi'an China, LONDON SCIENCE PUBLISHING, pp9-13.
7. SHI Bing, YANG Lipeng, HAN Yan, SUN Xiufeng, WU Jan, CHEN Ju, Study on Scour Hole Depth of Submarine Pipeline with Spoiler, Chinese-German Joint Symposium on Hydraulic and Ocean Engineering (CG JOINT 2010),September 21-27,2010,Tianjing, China, Tianjin university Press,pp416-421.
8. Zhang Zhiyong, Shi Bing, Lai Xu,Gao Xuerui , Nonlinear Simulation of Kaplan Turbine Regulating System Based on RBF Networks, International Conference on Electric information and Control Engineering(ICEICE2011)，Volume 5,IEEE Catalog Number:CFP1162K-PRT, ISBN: 978-1-4244-8037-1, pp4302-4306.
9. Xuejing Ruan, Bing Shi, Lipeng Yang and Zhiyong Zhang. An Experimental Study on Scour around the Submarine Pipeline with Spoilers under Wave Conditions [C]. Proceedings of 2011 The International Conference on Remote Sensing, Environment and Transportation Engineering ,Volume 4, IEEE Catalog Number:CFP1104M-PRT, ISBN:978-1-4244-9169-8, pp2891-2895.
10. Lipeng Yang , Bing Shi , Yakun Guo, Calculation on Dynamic Angle of Repose for Submarine Pipeline on Sandy Seabed, Applied Mechanics and Materials

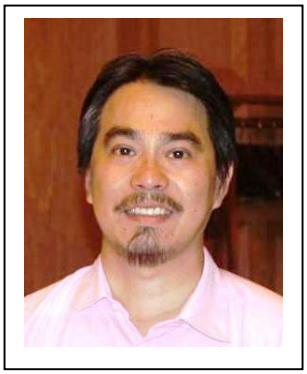
Vo.137,2012,pp210-214. Applied Mechanics and Civil Engineering, AMCE 2011.

11. Lipeng Yang, Bing Shi, Yakun Guo , Calculation and experiment on scour depth for submarine pipeline with a spoiler, Ocean Engineering ,Vol.55,2012,pp191-198.
12. Lipeng Yanga, Yakun Guo, Bing Shi, Cuiping Kuang Weilin Xu and Shuyou Cao, Study of scour around submarine pipeline with a rubber plate or rigid spoiler in wave conditions, Journal of Waterway, Port, Coastal, and Ocean Engineering, Vol.138,No.6,November 1,2012,pp484-490.
13. Lipeng Yang , Bing Shi , Yakun Guo, Study on dynamic angle of repose for submarine pipeline with spoiler on sandy seabed, Journal of Petroleum Exploration and Production Technology, Published online,12 October 2012, ISSN2190-0558.
14. .Duochang Zhao, Bing Shi*, Lipeng Yang, Zhiyong Zhang, An Experiment Study on the Performance of Wave Dissipation of Artificial Sand Bar, Applied Mechanics and Materials,Vol.226-228,2012,pp2299-2302.
15. ZHANG ZhiYong, SHI Bing*, GUO YaKun & YANG LiPeng, Numerical investigation on critical length of impermeable plate below underwater pipeline under steady current, Science China Technological Sciences, May (2013) Vol.56 No.5,pp1232-1240.
16. Lipeng Yang , Bing Shi , Yakun Guo , Lixiang Zhang , Jisheng Zhang , Yan Han ,Scour protection of submarine pipelines using rubber plates underneath the pipes,Ocean Engineering ,Vol. 84,2014, 176–182.
17. Guo, YK, Zhang, ZY and Shi, B. 2014. Numerical simulation of gravity current descending a slope into a linearly stratified environment. Journal of Hydraulic Engineering (ASCE), 140(12) DOI: 10.1061/(ASCE) HY.1943-7900.0000936.
18. H.C.Zheng,B. Shi,Q.Yu. Numerical Study on Spoiler Torque Effect to a Half Buried Pipeline, International Conference on Computer Information Systems and Industrial Applications(CISIA),June 28-29,2015,Bangkok,Thailand,ATLANTIS PRESS,ISBN:978-94-62520-72-1,Advance in Computer Science Research,Volume18,pp892-896.
19. E.J.Zhao,B. Shi,J.Zhang,K.Cao.Numerical Simulation of Mass Rato's Effect on Vortox-Induced Vibration of Suspended Submarine Pipeline, International

Conference on Computer Information Systems and Industrial Applications(CISIA),June 28-29,2015,Bangkok,Thailand,TLANTIS PRESS,ISBN:978-94-62520-72-1,Advance in Computer Science Research,Volume18,pp902-906.

20. Hai-Chen ZHENG,Bing SHI,Qian YU andEn-Jin ZHAO,Numerical Study on the Influence of Groove Structure toSubmarine Pipeline Resonance, International Conference on Advances in Management Science andEngineering (AMSE),July 26-27,2015,Phuket Thailand,DEStech Publication,Inc.ISBN:978-1-60595-267-3,pp27-30.

RUEY-SYAN SHIH



Title: Associate Professor
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Education:

Phd, National Taiwan Ocean University

Work Experience:

Associate Professor: Tungnan University
Editor: Journal of Coastal and Ocean Engineering (TSOE)
American Journal of Civil Engineering and Architecture

Research Interests:

Coastal Engineering- Coastal structures and hydrodynamics, Tsunami and Safety
Renewable Energy- Ocean Energy

Professional Memberships / Awards:

Life Member of the Taiwan Society of Ocean Engineering (TSOE)
Member of Coastal Education and Research Foundation (CERF)

Selected publications or research projects:

1. Shih, Ruey-Syan, 2016, "Investigation of random wave impact on highly pervious pipe breakwaters", *Applied Ocean Research*, Elsevier Publications. Vol. 58, pp. 146-163. (SCI)
2. Shih, Ruey-Syan, Weng wen-Kai, 2016, "Experimental determination of the performance characteristics of an undulating submerged obstacle", *Ships and Offshore Structures*, Taylor & Francis Publications. Vol. 11, No. 2, pp. 129-141. (SCI)
3. Shih, Ruey-Syan, Weng wen-Kai, 2016, "A Study of Long Wave Attenuation over Composite Undulating Breakwaters", *Journal of Coastal Research*, Coastal Education & Research Foundation Publications. Vol. 32, Issue 1, pp. 78-90. (SCI)
4. Shih, Ruey-Syan, Weng, Wen-Kai and Chou, Chung-Ren, 2015, "The performance characteristics of inclined highly pervious pipe breakwaters", *Ocean Engineering*, Elsevier Publications. Vol. 100, pp. 54-66. (SCI)
5. Shih, Ruey-Syan, Weng Wen-Kai, 2015, "Numerical Study of the Characteristics of Wave-wave Interactions in Multiphase Wave Field", *Engineering Analysis with Boundary Elements*, Elsevier Publications. Vol. 51, pp. 14-29. (SCI)
6. Weng Wen-Kai, Shih, Ruey-Syan, Tran Duc-Tru, 2015, "Analysis of the dynamics of a floating body with thin skirts by using the dual boundary element method", *Journal of Marine Science and Technology,* Vol. 23, No.5, pp. 598-607. (SCI)

HANS VON STORCH

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Education:

PhD: Hamburg University, Germany, 1979

Diploma: Hamburg University, Germany, 1976

Work Experience:

Meteorological department, University of Hamburg, 19765-1985

Max Planck It of Meteorology, Hamburg, 1986-1995

Helmholtz Zentrum Geesthacht, Germany, since 1996-

Guest professor, Ocean University of China, since 2013

Guest professor Shanghai Ocean University, since 2016

Research Interests:

Coastal and marine climate, climate change and impact; science-society interaction

Professional Memberships / Awards:

American Meteorlogcial Society, American Geophysical Union, Deutsche Meteorologische Gesellschaft, Deutsche Gesellschaft für Meeresforschung. Danmarks Meteorologiske Selskab

Several awards, e.g., Baltic Sea Award 2014

Selected publications or research projects:

Müller, P., and H. von Storch, 2004: *Computer Modelling in Atmospheric and Oceanic Sciences - Building Knowledge.* Springer Verlag Berlin - Heidelberg - New York, 304pp, ISN 1437-028X

Weisse, R., and H. von Storch, 2009: *Marine Climate & Climate Change. Storms, Wind Waves and Storm Surges.* Springer Praxis Books, 200 p. hardcover, ISBN: 978-3-540-25316-7

von Storch, H., K. Emeis, I. Meinke, A. Kannen, V. Matthias, B. W. Ratter, E. Stanev, R: Weisse and K. Wirtz, 2015: Making coastal research useful - cases from practice. *Oceanologia* 57, 3-16 10.1016/j.oceano.2014.09.001

von Storch, H., 江文胜 (Jiang W.), and K K. Furmancyk, 2014: Storm Surge Case Studies. In J. Ellis, D. Sherman, and J.F. Schroder (eds): *Coastal and Marine Natural Hazards and Disasters*, Elsevier Treatise in Hazards and Disasters Coastal and Marine Hazards, Risks, and Disasters

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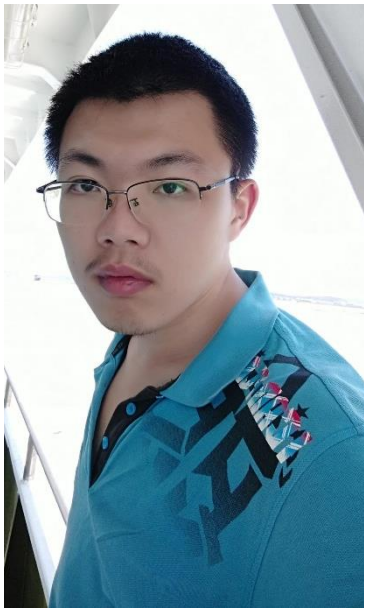

Education:

BEng: Zhejiang University, 2016

Work Experience:

None.

Research Interests:

Coastal and estuarine engineering

Professional Memberships / Awards:

None.

Selected publications or research projects:

None.

AIFENG-TAO

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EDUCATION:

2007 PhD Hohai University, Nanjing

RESEARCH INTEREST:

Freak Waves, Nonlinear water waves dynamics, Renewable marine energy, Wave modeling, Coastal dynamics

PROFESSIONAL MEMBERSHIP/AWARDS:

Postdoctoral Associate, 2008-2009,Centre for Ocean Engineering, Department of Mechanical Engineering, Massachusetts Institute of Technology, USA

SELECTED PUBLICATIONS OR RESEARCH PROJECTS:

[17] AF Tao, J Peng, JH Zheng, Y Wang, YQ Wu, Discussions on the occurrence probabilities of observed Freak waves, Journal of Marine Science and Technology, 2015, 23(6): 923-928

[18] Y Wang, AF Tao *, JH Zheng,DJ Doong,J Fan, and J Peng(2013), Preliminary investigation on the coastal rogue waves of Jiangsu, China, Nat. Hazards Earth Syst. Sci. Discuss., 1, 6593-6617, doi:10.5194/nhessd-1-6593-2013

[19] JS Zhang, J Wang, AF Tao*, JH Zheng, and Hui Li(2013), New Concept for Assessment of Tidal Current Energy in Jiangsu Coast, China," Advances in Mechanical Engineering, vol. 2013, Article ID 340501, 9 pages, 2013. doi:10.1155/2013/340501

[20] AF Tao , JH Zheng*, S Mee Mee, BT Chen(2012), The Most Unstable Conditions of Modulation Instability. Journal of Applied Mathematics, 2012, Article ID:656873, 11 pages, doi:10.1155/2012/656873

[21] AF Tao* , JH Zheng, S Mee Mee, BT Chen(2012), Properties of Freak Waves inducedby two kinds of nonlinear mechanisms, *Proceedings of the 33rd International Conference on Coastal Engineering*, Santander, Spain.

[22] AF Tao, JH Zheng*, S Mee Mee, BT Chen(2011), Re-study on recurrence period of Stokes wave train with High Order Spectral method. *China Ocean Engineering*, Vol. 25, No.4, pp. 679-686.

[23] AF Tao, YX Yan*, JH Zheng, W Zhang(2010), Characteristics of Stokes wave train long time evolution, *Proceedings of Chinese-German Joint Symposium on Hydraulic and Ocean Engineering*. Tianjin, pp.284-287.

[24] AF Tao*, & YM Liu(2010), Rogue Waves Due To Nonlinear Broadband Wave Interactions, *Proceedings of the 25th International Workshop on Water Waves and Floating Bodies (IWWWFB25)*. Harbin, Paper No. iwwwfb25_41

TING HUANG

Title: Lecturer

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Education:

2008.09-2012.06, doctoral candidate, Southeast University

Work Experience:

2012.06- , HOHAI UNIVERSITY

Research Interests:

Coastal and Maritime Engineering, Geotechnical Engineering

Professional Memberships / Awards:

Selected publications or research projects:

Ting Huang, Jinhai Zheng, Weiming Gong. (2015). The Group Effect on Negative Skin Friction on Piles. Procedia Engineering, 116(1):802-808.

Ting Huang, Jinhai Zheng, Guoliang Dai, Jisheng Zhang. (2014). Experimental Study on the Forces on Pile Groups in Wave-current Field. Proceedings of the 7TH Chinese-German Joint Symposium on Hydraulic and Ocean Engineering, Hannover, 7-12 September 2014.

Ting Huang, Weiming Gong, Jinhai Zheng, Guoliang Dai, Guoping Xu. (2013). Model Tests on Negative Skin Friction on Pile in Sand. Proceedings of The International Symposium on Advances in Foundation Engineering, Singapore, pp. 451-457.

Ting Huang, Weiming Gong, Guoliang Dai, Jinhai Zheng, Guoping Xu. (2013). Experimental Study of the Time Effect of Negative Skin Friction on Pile. Rock and Soil Mechanics, 34(10), 2841-2846.

Ting Huang, Weiming Gong, Guoliang Dai. (2010). The Research on Seismic Response of Piles in Wave-Current Field, Mechanics in Engineering, 32(5), 31-35.

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Education:

PhD: Ocean University of China, 2003

BEng: Ocean University of China, 1990

Work Experience:

Executive Vice Dean of the Graduate School, Ocean University of China, since 2016

Dean of College of Engineering, Ocean University of China, since 2010

Professor, Ocean University of China, since 2006

Associate Professor, Ocean University of China, 1999 – 2006

Lecturer, Ocean University of China, 1995 – 1999

Laboratory Technician, Ocean University of China, 1990 – 1995

Research Interests:

Harbour, channel and coastal engineering, the development and utilization of marine renewable energy

Professional Memberships / Awards:

OC member of Asian Wave and Tidal Energy Conference

National Science & Technology Progress Awards (Second Class), 2010

Selected publications or research projects:

Shi Hongda, et al. Theoretical study on the power take-off estimation of heaving buoy wave energy converter(J). Renewable Energy, Vol.86: 441-448, 2016.

Shi Hongda, et al. The latest progress in wave energy conversions in China and the analysis of a heaving buoy considering PTO damping(J), Journal of Marine Science and Technology-Taiwan,Vol:23, P:888-892,2015.

Xu Yu, Liu Yong, **Shi Hongda**. Experimental studies on wave forces acting on caisson foundations of wave energy devices(C). \\The 25th International Ocean and Polar Engineering Conference. Hawaii, American. June 21-26, 2015.

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Education:

Ph.D., Department of Civil Engineering, National Cheng Kung University, Taiwan (1988)

MS, Institute of Oceanography, National Taiwan University, Taiwan (1981)

BS, Department of Hydraulic Engineering, National Cheng Kung University, Taiwan (1979)

Research Interests:

Coastal Engineering, Wave-Structure-Soil Interaction, Computational Nearshore Hydrodynamics, Maritime Energy, Artificial Neural Network Applications.

Professional memberships / Awards:

Medals of Undersea Technology, Chinese Ocean & Underwater Technology Association (2016)

Fellow, The Institution of Engineering and Technology (IET)

Chairman, The Committee of Ocean Engineering, Chinese Institute of Civil and Hydraulic Engineers

Executive Committee Member, Taiwan Society of Ocean Engineering

TPC Member, The International Society of Offshore and Polar Engineers (ISOPE)

Selected publications:

Tsai, C.P., Chen, Y.C., Chen, C.J., and Lin, C., 2016. Simulation of the effect of breakwater on the propagation of solitary waves, *Journal of Marine Science and Technology*, Vol. 24, No. 4.

Tsai, C.P., Daemrich, K.F., and Ho, C.L., 2016. Probability calculation method with neural network for estimating wave overtopping at coastal structures: Learning from regular wave tests, *Journal of Marine Science and Technology*, Vol. 24, No. 3, pp. 449-457.

Lin, C., Yu, S.M., Yeh, P.H., Yu, M.S., Tsai, C.P., Hsieh, S.H., Kao, M.J., Tzeng, G.W. and Raikar, R., 2015. Characteristics of boundary layer flow induced by solitary wave propagating over horizontal bottom, *Journal of Marine Science and Technology*, Vol. 23, No. 6, pp. 909-922.

Tsai, C.P., Chen, H.B. and Hsu, J.R.C., 2014. Second-order time-dependent mild-slope equation for wave transformation. *Mathematical Problems in Engineering,* Volume 2014, Article ID 341385.

Tsai, C.P. and You, C. Y., 2014. Development of models for maximum and time variation of storm surges at the Tanshui estuary, *Natural Hazards and Earth System Sciences*, Vol. 14, 2313–2320.

Tsai, C.P., Yen, C.C. and Lin, C., 2013. Numerical simulation on the skimming flow over a

vertical drop pool. *Journal of Engineering Mechanics, ASCE*, 04014044.

Tsai, C.P., Huang, C.H., Chien, H., Cheng, H.Y. and Lee, W.C., 2012. Study on the wave climate variation to the renewable wave energy assessment. *Renewable Energy*, Vol. 38, No. 1, pp. 50-61.

Chen, H.B. and Tsai, C.P., 2012. Computations of nearshore wave transformation using finite-volume method. *Applied Ocean Research*, Vol. 38, pp. 32-39.

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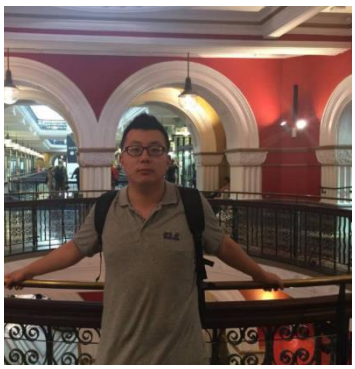

Education:

PhD: Ocean University of China, 2014-now

Master: Ocean University of China, 2012-2014

Work Experience:

Research Interests:

Swash zone, Sediment transport

Professional Memberships / Awards:

Selected publications or research projects:

Jun Wang, Bingchen Liang, Huajun Li, Xinying Pan, Dongyoung Lee, and Yu Xu Swash Motion Driven by the Bore and Prediction of Foreshore Profile Change. [J]. Journal of Coastal Research, 2016, pp. 492 – 496.

Wu G, Wang J, Liang B, et al. Simulation of Detailed Wave Motions and Coastal Hazards[J]. Journal of Coastal Research, 2014, pp. 127-132.

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Title: Candidate of PhD

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Harbor Research Branch at Navy Engineering Design Research Institute

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Education:

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Work Experience:

ENGINEER, HARBOR RESEARCH BRANCH AT NAVY ENGINEERING DESIGN & RESEARCH INSTITUTE (2001- PRESENT)

Research Interests:

Wave physical model research for coastal engineering, numerical simulations of wave climate with WAVEWATCH III and SWAN, extreme value theory, simulation of tropical cyclone wave.

Professional Memberships / Awards:

NONE

Selected publications or research projects:

Wang Lvqing, Feng Weibing & Tang Xiaoning, et. Al, Preliminary study on wave energy potential assessment along China mainland (in Chinese),2014,36(5) :1-7.

WANG Lv-qing, FENG Wei-bing, TANG Xiao-ning, J. Wave energy features of china's provincial offshore areas(in Chinese), Renewable Energy Resources, 2013,183(11):126-131.

Wang Lvqing, Tang Xiaoning, Xia Yunqiang,et. al, Assessment of Wave Energy Resources in Zhoushan Isalnds(in Chinese) , Renewable Energy Resources,2013,

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Hydrodynamic analysis of marine engineering structures

Professional Memberships / Awards:

Selected publications or research projects:

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BEng: Shandong Polytechnic University, 1982

Work Experience:

Professor, Ocean University of China, since2002

Professor, WeifangUniversity, 1993-2002

Research Interests:

Marine engineering equipment and instrument development， Ocean energy technology

Professional Memberships / Awards:

Member of Ocean Energy Committee of China Renewable Energy Society.
Senior Member of Chinese Mechanical Engineering Society.
Third Prize of Provincial Award for Progress in Science and Technology.
First Prize of Municipal Award for Progress in Science and Technology.
Outstanding Youth on Science and Technology of Department of Electrical.
Outstanding young intellectuals of Shandong Province.
Provincial Young Academic Elite in Universities of Shandong Province.

Selected publications or research projects:

Shujie Wang, Chao Xu, Peng Yuan, Yingying Wang. Hydrodynamic Optimization of Channelling Device for Hydro Turbine Based on Lattice Boltzmann Method[J]. Computers & Mathematics with Applications, Vol.61, Issue 12, June 2011, Pages 3722-3729. (SCI)

Shujie Wang, Peng Yuan, Dong Li, Yuhe Jiao. An overview of ocean renewable energy in China[J]. Renewable and Sustainable Energy Reviews, 2011.Vol 15.1, p91-111. (SCI)

Wang Shujie, Li Dong, Lu Lanshuai, et al. Study and innovation of a flexible blade turbine, a new type of tidal current generating device. Engineering Sciencec，2010,8（1）：11~15.

RALF WEISSE

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PhD in Geosciences, University of Hamburg / Max-Planck-Institute for Meteorology (1994); Diploma in Meteorology, Humboldt-University zu Berlin (1990); Technical Meteorological Assistant, German Weather Service (1985)

Work Experience:

HEAD OF THE COASTAL CLIMATE DEPARTMENT AT THE HELMHOLTZ-ZENTRUM GEESTHACHT (2001-PRESENT)

RESEARCH SCIENTIST, HELMHOLTZ-ZENTRUM GEESTHACHT (2000-2001)

RESEARCH SCIENTIST, MAX-PLANCK-INSTITUTE FOR METEOROLOGY (1994-2000)

Research Interests:

Coastal climate in particular wind waves, storm surges, mean sea level changes and tropical and extra-tropical cyclones

Professional Memberships / Awards:

German Meteorological Society (Member)

Baltic Earth Scientific Steering Group

Selected publications or research projects:

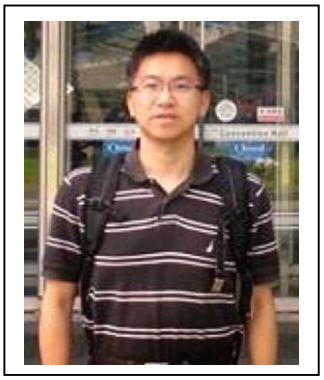
Geyer, B.; Weisse, R.; Bisling, P. & Winterfeldt, J. Climatology of North Sea wind energy 1958-2012 derived from a model hindcast Journal of Wind Engineering and Industrial Aerodynamics, 2015, 147, 18-29.

Weisse, R.; Bisling, P.; Gaslikova, L.; Geyer, B.; Groll, N.; Mahboubeh, H.; Matthias, V.; Maneke, M.; Meinke, I.; Meyer, E.; Schwichtenberg, F.; Stempinski, F.; Wiese, F. & Wöckner-Kluwe, K. Climate services for marine applications in Europe Earth Perspectives, 2015, 2:3, 1-14

Weisse, R.; Bellafiore, D.; Menendez, M.; Mendez, F.; Nicholls, R.; Umgiesser, G. & Willems, P. Changing extreme sea levels along European Coasts Coastal Engineering, 2014, 87, 4-14

Wahl, T.; Haigh, I.; Woodworth, P. L.; Albrecht, F.; Dillingh, D.; Jensen, J.; Nicholls, R.; Weisse, R. & Wöppelmann, G. Observed mean sea level changes around the North Sea coastline from 1800 to present Earth Science Reviews, 2013, 124, 51-67

CHIH CHUNG WEN



Title: ASSOCIATE PROFESSOR

Department: Department of Safety, Health a Environmental Engineering, HungKua University

City: Taichung

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Education

ChengKung University, Taiwan

Work Experience:

Assistant Professor, Hungkuang University.

Research Interests:

Coastal Engineering – Coastal Environment

Coastal Engineering– Hydrodynamic

Professional Memberships / Awards:

Member, The Taiwan Society of Ocean Engineering

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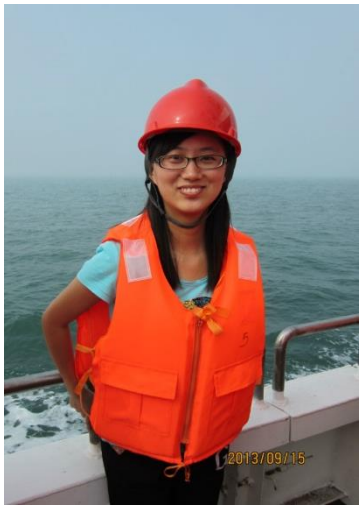

Education:

MSc candidate: Ocean University of China, since Sept.2014

BSc: Ocean University of China, 2014

Work Experience:

undergraduate

Research Interests:

Ocean acoustic, Ocean acoustic tomography

Professional Memberships / Awards:

Participate in Projects of the National Natural Science Foundation of China,

Participate in 530 project.

The Graduate Second Prize Scholarship.

Be honored as "Outstanding Graduate Student"

Selected publications or research projects:

Fengdan Wen, Gaokun Yu. The Use of the Virtual Source Technique in Computing Scattering From Sinusoidal Ocean Floor. Undergraduate thesis.

Wen Kai Weng

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Education:

PhD, National Chiao Tung University, 1995

Research Interests:

Wave-structure interaction, Dynamic of floating structure, Hydraulic dynamic model tests

Selected publications or research projects:

1. Yung-Chuan Chiou, Yi-Ming Jen, Wen-Kai Weng (2011)"Experimental investigation on the effect of tensile pre-strain on ratcheting behavior of 430 Stainless Stell under fully-reversed loading condition", Engineering Failure Analysis, Vol. 18, issue 2, pp.766-775。
2. Wen-Kai Weng, Chung-Ren Chou, John Z. Yim, Yung-Fang Chiu, Liang-Sheng Ho, (2011)"Measuring Wave Fields Using a Marine Radar"，Journal of Coastal and Ocean Engineering,11,1, 31-56.
3. W.K. Weng, C.R. Chou, W.P. Huang, J.Z. Yim (2011)"Monitoring the Coasts around Taipei Port with a Marine Radar", Journal of Shipping and Ocean Engineering, Vol. 1, No. 3,pp.169-179.
4. Wen-Kai Weng, Jaw-Guei Lin and Chun-Sien Hsiao (2013). An experimental study of regular long crested waves over a crescent type shoal. Journal of Marine Science and Technology, 21,222-228.
5. Wen Kai Weng, Ruey Syan Shih, Chung Ren Chou (2013). Developing of Serpent-type Wave Generators to Solitary Wave Simulations with BEM. Journal of China Ocean Engineering. Vol.27 No. 5 pp671-682.
6. Ruey Syan Shih, Wen Kai Weng, Chung Ren Chou (2013). Numerical Modeling of Wave Field around Multiple Submerged Breakwaters, Journal of Marine Science, 2013,3(3);65-78
7. Ruey-Syan Shih,Wen-Kai Weng (2014)."Experimental determination of the performance characteristics of an undulating submerged obstacle", Ships and Offshore Structures, published online 14/10/2014
8. Ruey-Syan Shih,Wen-Kai Weng (2014)."A Study of Long Wave Attenuation over Composite Undulating Breakwaters", Journal of coastal research. published online 3/10/2014

9. R.S. Shih, W.K. Weng (2015).”Numerical study of the characteristics of wave-wave interactions in a multiphase wave field”, Engineering Analysis with Boundary Elements, 51, 14-29.
10. Wen-Kai Weng,Ruey-Syan Shih, and Duc-Tru Tran(2015).”Analysis of the Dynamic of a Floating Body with Thin Skirts by using Dual Boundary Element Method”, Journal of Marine Science and Technology, Vol. 23, No. 5, pp. 598-607

LINJIAN WU

Dr.

State Key Laboratory of Hydraulic Engineering Simulation and Safety; Collaborative Innovation Center for Advanced Ship and Deep-Sea Exploration, Tianjin University

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Education:

PhD Candidate: Tianjin University, Sept. 2015 – Today

Master: Chongqing Jiaotong University, Jun. 2015

BEng: Chongqing Jiaotong University, Jun. 2012

Research Interests:

Durability evaluation for reinforced concrete structure; Hydrodynamic performance for floating structures; Port, coastal, offshore and ocean engineering.

Professional Awards:

Second Prize of National Award for Electric Power Reform and Innovation, 2012

Selected publications or research projects:

Linjian Wu, Yuanzhan Wang, Zhong Xiao, and Yi Li. Hydrodynamic force on flexible connectors of semi-submersible type very large mobile offshore base at rough sea states. Petroleum Exploration and Development, 2016, accepted.

Linjian Wu, Yuanzhan Wang, Zhong Xiao, and Yi Li. Simplified method for hydrodynamic constraint loads of connectors on mobile offshore base. Applied Ocean Research, 2016, submitted.

Linjian Wu, Yuanzhan Wang, Zhong Xiao, and Chunning Ji. A new numerical algorithm for wave shoaling based on radial basis function. Journal of hydrodynamics. Ser. B, 2016, submitted.

Linjian Wu, Yuanzhan Wang, Zhong Xiao, and Yi Li. Approximate method for hydrodynamic performance of mobile offshore base at extreme sea states. Ocean Engineering, 2015, revising.

ZHONG XIAO

Associate Professor

School of Civil Engineering

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Educa

PhD: Tianjin University, China, 2009

BEng: Harbin Engineering University, China, 2005

Work Experience:

Visiting scholar, Centre for Offshore Foundation Systems, The University of Western Australia, Aug. 2014 – Aug. 2015.

Associate professor, Tianjin University, since Aug. 2015

Lecturer, Tianjin University, Oct. 2009 – Jun. 2015

Research Interests:

Port, coastal and offshore engineering

Professional Memberships / Awards:

2010 science and technology outstanding winner, "Study on interaction of wave, breakwater and soil foundation in offshore deep-water port engineering", China water transportation construction association, 2010;

The Third Outstanding Paper Award of "Doctoral Forum of China: Estuarine & Coastal Sciences", "Analysis of cyclic bearing capacity for large cylindrical structure on soft clay reinforced by drainage plate", Ministry of Education of China, 2008.

Selected publications or research projects:

Zhong Xiao, Yinghui Tian, Susan Gourvenec. A practical method to evaluate failure envelopes of shallow foundations considering soil strain softening and rate effects [J], Applied Ocean Research, 2016, 59: 395-407.

National Natural Science Foundation of China (No. 51479133), "Studies on the motion morphology and stability of a new type of circular and rectangular suction breakwater inserted in soft foundation under cycle impact of breaking wave", 01/01/2015～31/12/2018.

XU XUEFENG

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Education:

PhD: Zhejiang University, 2014

MD: The Second Institution of oceanography. SOA, 2006

BD: Zhejiang University, 2003

Work Experience:

Senior Engineer, Engineering Oceanography Laboratory of SIO. 2013~2016

Engineer, The Second Institution of oceanography. SOA, 2006~2012

Research Interests:

Marine energy, Marine Science and Technology

Professional Memberships / Awards:

Papers: 11 published papers, 6 of which as the first author.

Patent: As the first inventor of 6 patents, including 2 invention patents, 1 International patent.

Report: wrote 14 technical reports .

Awards: 2013, won the National Marine Science and Technology Award, The Second Prize -- The typical reclamation comprehensive evaluation system and demonstration research.

Selected publications or research projects:

Xu Xuefeng. Numerical Research on Dynamic Water-Head of Gulf Tidal Energy: A New Exploration on Development Way of Tidal Energy. Journal of Coastal Research (JCR)(Winter).

Xu Xuefeng. Method and system for generating electricity. IP Australia, 2010330716

许雪峰. 潮流通道堵坝工程的冲淤影响计算. 水力发电学报, 2011,(1)

许雪峰. 动态潮汐能大坝水头数值计算. 水力发电学报, 2015,(11)

ZHONGLIANG YANG

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Education:

B.S. degree in marine science, Ocean University of China, 2004

M.S. degree in physical oceanography, Ocean University of China, 2007

Work Experience:

Engineer, Second Institute of Oceanography, SOA, since Jan. 2011

Assistant Engineer, Second Institute of Oceanography, SOA, Sep. 2007 – Dec. 2010

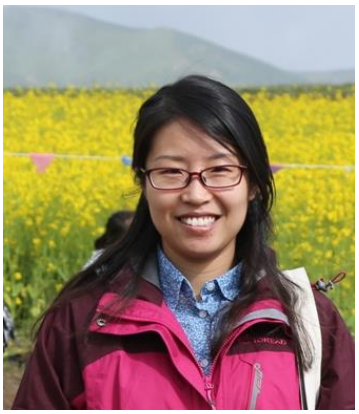
Research Interests:

Oceanographic hydrological observation and numerical simulation of offshore engineering, especially in waves.

Selected publications or research projects:

1. YANG Zhong-liang, YE Qin, SHI Wei-yong. Application of measured wave spectrum in the wave energy analysis of Northern Fujian sea [J]. Journal of Applied Oceanography, 2016, 35(1),15-19. (in Chinese)
2. YE Qin, YANG Zhong-liang, SHI Wei-yong et al. Assessment of China's offshore wave energy resources based on the high-resolution numerical simulation technology [J]. Journal of Ocean Technology.2014,33(4),117-121.(in Chinese)
3. YE Qin, YANG Zhong-liang, SHI Wei-yong. A preliminary study of the wave energy resources in the sea adjacent to Zhejiang [J]. Journal of Marine Sciences, 2012, 30(4), 13-19. (in Chinese)

JIE-YANG



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EDUCATION:

2010 PhD Tsinghua University, Beijing

RESEARCH INTEREST:

Coastal hydrodynamics, Coastal water environmental modeling, Coastal sediment transport processes

SELECTED PUBLICATIONS OR RESEARCH PROJECTS:

[25] J Yang*, Q Zhang, J Yao, JF Tao(2016), Transport characteristics of land-sourced pollutants along Jiangsu coast using Lagrangian particle-tracking techniques, *Proceedings of the 26th International Ocean and Polar Engineering Conference*. Rhodes, Greece, pp.834-839.

[26] J Yang*, & JF Tao(2016). The retention and transport patterns of pollutants in the radial sand ridges of the South Yellow Sea, In: Vila-Concejo, A.; Bruce, E.; Kennedy, D.M., and McCarroll, R.J. (eds.), *Proceedings of the 14th International Coastal Symposium (Sydney, Australia). Journal of Coastal Research, Special Issue,* No. 75, pp. 183-187. Coconut Creek (Florida), ISSN 0749-0208.

[27] Q Zhang, JF Tao*, J Yang(2016), Numerical study on the transport timescale in a fluvial and macro-tidal estuary. In: Vila-Concejo, A.; Bruce, E.; Kennedy, D.M., and McCarroll, R.J. (eds.), *Proceedings of the 14th International Coastal Symposium (Sydney, Australia). Journal of Coastal Research, Special Issue*, No. 75, pp. 193-197. Coconut Creek (Florida), ISSN 0749-0208.

[28] HJ Zhao*, J Yang, GP Chen(2014), Tieshan port development plan: Evaluation of the long wave induced resonance using a numerical mild-slope model. *Applied Mechanics and Materials*, Vol. 582, pp. 2154~2165.

[29] J Yang*(2012), Comparison of two different methods for transport time scales calculation applying to a realistic case. *The proceedings of 6th Chinese-German Joint Symposium on Hydraulic and Ocean Engineering*. Keelung, pp. 539-548.

[30] J Yang, &XP Yu*(2010), Computational methods for transport time scales in a bay. *Journal of Tsinghua University*, Vol.50, No. 9, pp. 1334-1337.

Yin Zegao

Title: Associate Professor

Department: Department of Ocean Engineering

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Education

2002.09-2005.07, Zhejiang University, Ph.D. in Municipal Engineering
1999.09-2002.07, North China University of Water Conservancy and Electric Power, Eng. M. in Hydraulics and River Dynamics
1995.09-1999.07, North China University of Water Conservancy and Electric Power, Eng. B. in Technology and Economy

Work Experience

2005.07 –Now, Work in Engineering College, Ocean University of China
2011.09 -2012. 09, Visiting professor, Department of Civil and Environmental Engineering, University of Alberta, Canada

Research Interests

Hydrodynamics,

Ocean energy utilization,

Two phase flow.

Research Projects

1. Be in charge of "Water-air two-phase flow hydrodynamic behavior and oxygen supply mechanics research on aeration of a wave floater device oscillating vertically", sponsored by National Natural Science Foundation of China, from 2016 to 2019.
2. Be in charge of "Dissolved oxygen behavior research on water and air mixture plug discharge under aerated condition", sponsored by National Natural Science Foundation of China, from 2011 to 2013.
3. Be in charge of "Aeration and oxygen supply device development with wave floater", sponsored by Shandong Province Science and Technology Development Plan, from 2014 to 2016.

Major Publication:

1. **Yin Zegao** et al., Oxygen transfer by air injection in horizontal pipe flow,Journal of Environmental Engineering-ASCE, 2013, 139:908-912

2. **Yin Zegao** et al., Oxygen transfer characteristics of water and bubble mixture pipe flow through two sudden contractions and expansions, Journal of Hydrodynamics, 2014, 26(5):745-750
3. **Yin Zegao** et al., Theoretical analysis and experimental study of oxygen transfer under regular and non-breaking waves, Journal of Hydrodynamics, 2013, 25(5):718-724
4. **Yin Zegao** et al., Experimental study of dissolved oxygen transport by regular waves through a perforated breakwater, Journal of Ocean University of China, 2016, 15(1):78-82
5. **Yin Zegao** et al. Numerical simulation of flow past circular duct. Water Science and Engineering, 2010, 3(2): 208-216
6. **Yin Zegao** et al., 2-D numerical simulation o crush bedrock river, Journal of Hydrodynamics, 2004(4):449-454
7. Liang Bingchen, Fan Fei, **Yin Zegao** et al., Numerical modelling of the nearshore wave energy resources of Shandong peninsula, China, Renewable Energy, 2013, 57:330-338

CHI ZHANG

Title: Associate Professor, Ph.D.

Department: State Key Laboratory of Hydrology-Water Resources and Hydraulic Engineering, Hohai University

Address: 1 Xikang Road, 210098, Nanjing

E-mail: zhangchi@hhu.edu.cn

Education:

2010 Ph.D. Hohai University

Work Experience:

since 2012 Associate Professor Hohai University

2010-2012 Lecturer Hohai University

Research Interests:

Nearshore hydrodynamics, Coastal sediment transport,
Coastal morphology evolution, Wave-seabed-structure interaction

Professional Memberships / Awards:

[1] Best Paper Award, ASCE Journal of Waterway, Port, Coastal and Ocean Engineering, 2015

[2] Outstanding Contribution to ICCE 2012, CERC, 2012

[3] Nomination for the National Outstanding Doctoral Thesis, Ministry of Education, 2012

Selected publications or research projects:

[1] Zhang Chi, Zhang Qingyang, Wu Zaitian, Sui Titi, Wen Yuncheng. Numerical study on effects of the embedded monopile foundation on local wave-induced porous seabed response. Mathematical Problems in Engineering, 2015, 10246.

[2] Gu Zhenhua, Zhang Chi*, Zheng Jinhai. Influences of wave forcing and morphological variability on the evolution of a double sandbar system. Journal of Engineering for the Maritime Environment, 2015, DOI: 10.1177/1475090215589979 ‘

[3] Sui Titi, Zhang Chi*, Guo Yakun, Zheng Jinhai, Jeng Dongsheng, Zhang Jisheng, Zhang Wei. Three-dimensional numerical model for wave-induced seabed response around mono-pile. Ships and Offshore Structures, 2015, DOI: 10.1080/17445302.2015.1051312

[4] Zhang Chi, Zheng Jinhai and Zhang Jisheng. Predictability of wave-induced net sediment transport using the conventional 1DV RANS diffusion model. Geo-Marine Letters, 2014, 34(4): 353-364.

[5] Zheng Jinhai, Zhang Chi, Demirbilek Zeki, and Lin Lihwa. Numerical study of sandbar migration under wave-undertow interaction. ASCE Journal of Waterways, Port, Coastal, and Ocean Engineering, 2014, 140 (2): 146-159.

[6] Zhang Chi, Zheng Jinhai, Dong Xiaowei, Cao Kai and Zhang Jisheng. Morphodynamic response of Xiaomiaohong tidal channel to a coastal reclamation project in Jiangsu Coast, China. Journal of Coastal Research, 2013, SI 65: 630-635.

MINGJIN ZHANG

Associate Professor
Department of River Harbor & Waterway Engineering Research Center
Deputy director
No. 2618, Xingang Erhao Road,
300456, Tianjin, Tanggu Binhai New Area
Email: zhangmingjin@tiwte.ac.cn

Education:

PhD: Tianjin University of China, 2015

BEng: Hohai University of China, 2005

Work Experience:

Associate professor, Tianjin Research Institute for Water Transport Engineering, since Apr. 2005.

Research Interests:

Waterway Engineering (1. Numerical simulation of flow and sediment 2. Waterway regulation for mountain and plain river)

Professional Memberships / Awards:

Research on numerical simulation technologies of flow and sediment movement in river won the Award of Science and Technology Progress of Ministry of Communication, P. R. China, 2010.

Selected publications or research projects:

Mingjin Zhang, Yanhua Yang, Yuchuan Bai. Evoluion Features of Turbulent Structures in A Bend River. Journal of Basic Science and Engineering, 2014.6, 22(3):469-480.

Mingjin Zhang, Yanhua Yang, Huaqing Zhang, Yuchuan Bai. Effect of protective control works on improving waterway condition in middle reaches of Yangtze River after impounding of Three Gorges Reservoir. Advances in Science and Technology of Water Resources, 2015.7, 35(4):55-58.

Mingjin Zhang, Yang Yang， Yongcheng Wang. Study on characteristics of hazardous shoals in the Lancang-Mekong International Waterway and targeted regulation principles. Journal of Waterway and Harbor, 2016.2, 37(1):55-60.

Xueming Zhang
Professor
Department of Physics,
Northeast Normal University.
5268 Renmin Street,
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Education:

BEng: Northeast Normal University, 1974

Work Experience:

Professor, Northeast Normal University

Research Interests:

Development and utilization of marine renewable energy and wind energy

Professional Memberships:

China renewable energy society, deputy director of marine energy Specialized Committee.

Research projects:

National "863" project "Key technology of tidal Current turbine".

National special fund project.

SELECTED PUBLICATIONS:

Baigong Wu, Xueming Zhang*, et al. Design of high-efficient and universally applicable blades of tidal stream turbine. ENERGY, 2013.10, 60: 187-194.

Yongjun Dong, Jingfu Guo, Xueming Zhang*. Development and Performance Analysis of a Small Island Wind Turbine Generator System with High Reliability. J ENERG ENG-ASCE, 2013.9, 139(3): 223-229.

Xiao Zhang, Xueming Zhang*, et al. Numerical Calculation of the Hydrodynamic Performance of Con-horizontal Tidal Current Self-pitch Turbine with Dual Rotor. Journal of Computational Information Systems, 2013.5, 9(10): 4193-4200.

YAQUN ZHANG

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Education:

PhD: University of Chinese Academy of Sciences, 2015

BEng: Wuhan University of technology , 2007

Work Experience:

Associate Research Fellow, Guangzhou Institute of Energy Convesion, Chinse Academy of Science 2015-2016

Research Assistants, Guangzhou Institute of Energy Convesion, Chinse Academy of Science, Dec. 2009- Dec. 2014

Research Interests:

Development and utilization of wave energy

Professional Memberships / Awards:

Ocean Technology Awards, 2015

Selected publications or research projects:

Zhang Yaqun, Yage You, Songwei Sheng, Bijun Wu.Research on Energy Conversion System of Floating Wave Energy Converter, China Ocean Engineering, Vol.28, No.1, pp.105-113, 2014.

Zhang Yaqun, Yu Longfei ,Sheng Songwei. Research on Power Take-Off System of Floating Wave Power Device. Acta Energiae Solaris Sinica. Vol,35(10),pp.2071-2076,2014

YANG ZHANG

Title: Doctor student

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Education:

Graduated with Bachelor on Harbor, Waterway and Coastal Engineering from Dalian University of Technology, Dalian, China in June, 2012.

Graduated with Master on Hydraulic Engineering from the State Key Laboratory of Coastal and Offshore Engineering, Dalian University of Technology, Dalian, China in June, 2014.

Doctor student on Harbor, Coastal and Nearshore Engineering of the State Key Laboratory of Coastal and Offshore Engineering, Dalian University of Technology, Dalian, China from Sep. 2014 to now.

Work Experience:

Research Interests:

Coastal erosion and recovery, Coastal sediment motion.

Professional Memberships / Awards:

Selected publications or research projects:

Zhang Yang, Zou Zhi-li, He Guan-hong: Experiment study on the characteristics of sandbar beach sediment transport rates [J]. Journal of Sediment Research, 2016(1), 68-75. (In Chinese)

Zhang Yang, Zou Zhi-li, Gou Da-xun, et al: Experiment study on evolution and geometrical characteristics of sandbar profile and berm profile [J]. Haiyang Xuebao, 2015(1), 147-157. (In Chinese)

YANG ZHAO

Phd candidate

College of Engineering

238 Songling Road, Qingdao

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Education:

PhD: Ocean University of China, 2015-now

BEng: Ocean University of China, 2008-2012

Work Experience:

Research Interests:

New type of coastal structure

Professional Memberships / Awards:

Selected publications or research projects:

Zhao Yang, Liu Yong and Li Huajun. Wave interaction with a partially reflecting vertical wall protected by a submerged porous bar. *Journal of Ocean University of China*, 2016, 15(4), 619–626

NAME: Xuanlie Zhao

Title: Doctoral Student
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Education:

2009.9—2013.7 Shandong Jiaotong University Bachelor Degree
2013.9—2015.7 Dalian Ocean University Master Degree
2015.9— Dalian University of Technology Ph.D Student

Work Experience:

Research Interests:

Wave energy utilization; wave structure interaction.

Professional Memberships / Awards:

Selected publications or research projects:

1. Dezhi Ning, Xuanlie Zhao, Malin Göteman, Haigui Kang. Hydrodynamic performance of a pile-restrained WEC-type floating breakwater: An experimental study[J]. Renewable Energy, 2016, 95: 531-541.
2. Dezhi Ning, Xuanlie Zhao, Haigui Kang, Malin Göteman.Effect of PTO on the Dynamics of a WEC-type Floating Breakwater, ISOPE, 2016, Rhodes, Greece.

JINHAI ZHENG

Professor

College of Harbor Coastal and Offshore Engineering

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Education:

PhD: Hohai University, 1998

BEng: Hohai University, 1993

Work Experience:

Visiting Fellow, University of Dundee, Dec. 2010, Apr. 2013

Visiting Fellow, Rostock University, Jul. 2010 – Aug. 2010, Jul. 2011 – Aug. 2011

Professor, Hohai University, since Dec. 2006

Visiting Fellow, Kyoto University, Oct. 2005 – Sept.2006

Associate professor, Hohai University, Apr. 2001 – Dec. 2006

Lecturer, Hohai University, Sept. 1998 – Apr. 2001

Research Interests:

Coastal and estuarine processes, Coastal and estuarine engineering

Professional Memberships / Awards:

Best Paper Award, ASCE- Journal of Waterways, Port, Coastal, and Ocean Engineering, 2014

Key Technology and Applications of Multi-objective Hydraulic Control in Complex River Network. Second Prize of National Award for Progress in Science and Technology, 2014

Selected publications or research projects:

Development and Conservancy in Estuaries and Coasts. National Science Fund for Distinguished Young Scholars (Grant No. 51425901), January/2015-December/2019

Zheng Jinhai, Xiong Mengjie, Wang Gang. Trapping mechanism of submerged ridge on trans-oceanic tsunami propagation. China Ocean Engineering, 2016, 30(2): 271-282

Zheng Jinhai, Zhang Jisheng, Wang Jun, Tao Aifeng. Evaluation of tidal stream energy around radial sand ridge system in the southern Yellow Sea. Journal of Marine Science and Technology, 2015, 23(6): 951-956

Zheng Jinhai, Zhang Chi, Demirbilek Zeki, Lin Lihwa () Numerical study of sandbar migration under wave-undertow interaction. ASCE Journal of Waterway, Port, Coastal and Ocean Engineering, 2014, 140 (2): 146-159

Zhou Xiaoyan, Zheng Jinhai, Doong Dong-Jiing, Demirbilek Zeki (2013) Sea level rise along the East Asia and Chinese coasts and its role on the morphodynamic response of the Yangtze River Estuary. Ocean Engineering, 71: 40-50

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Education:

2005.04-2009.05, University of Aberdeen, UK, PhD, Coastal Engineering
2002.09-2005.03, Chongqing Jiaotong University, MEng, Hydraulic Engineering
1998.09-2002.07, Chongqing Jiaotong University, BEng, Harbor, Coastal and Offshore Engineering

Research Interests:

Tidal stream energy, Wave-seabed-structure interaction; Numerical modeling

Selected publications or research projects:

1. Zhang Jisheng, Gao Peng, Zheng Jinhai, Wu Xiuguang, Peng Yuxuan. Current – induced seabed scour around a pile-supported horizontal-axis tidal stream turbine. Journal of Marine Science and Technology, 2015, 23(6), 929-936.
2. Zhang Jisheng, Zheng Jinhai, Jeng Dong-sheng, Guo Yakun. Numerical simulation of solitary wave propagation over a steady current. ASCE Journal of Waterway, Port, Coastal and Ocean Engineering, 2015, 141(3), 04014041.
3. Zhang Jisheng, Zhang Yu, Jeng Dongsheng, Liu Philips Li-Fan, Zhang Chi. Numerical simulation of wave-current interaction using a RANS solver, Ocean Engineering, 2014, 75, 157-164.
4. Zhang Jisheng, Zheng Jinhai, Zhang Chi, Jeng Dongsheng, Guo Yakun. Numerical study on the interaction between waves and twin pipelines in sandy seabed. Journal of Coastal Research, 2013, Special Issue No. 65, 428-433.
5. Zhang Jisheng, Zhang Yu, Zhang Chi, Jeng Dongsheng. Numerical modeling of seabed response to combined wave-current loading. Journal of Offshore Mechanics and Arctic Engineering, 2013, 135(3), 031102.
6. Zhang Jisheng, Zheng Jinhai, Jeng Dongsheng, Wang Gang. Numerical simulation of solitary wave induced flow motion around a permeable submerged breakwater. Journal of Applied Mathematics, 2012. (doi:10.1155/2012/508754)
7. Zhang Jisheng, Jeng Dongsheng, Liu Pilips Li-Fan, Zhang Chi. Response of a porous seabed to water waves over permeable submerged breakwaters with Bragg reflection. Ocean Engineering, 2012, 43, 1-12.
8. Zhang Jisheng, Jeng Dongsheng, Liu Pilips Li-Fan. Numerical study for waves propagating over a porous seabed around a submerged permeable breakwater: PORO-WSSI II model. Ocean Engineering, 2011, 38(7), 954-966.

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2010.9-2014.9 University of Dundee, UK, Civil Engineering, Doctor

2007.9-2010.9 Ocean University of China, Marine Geology, Master

2003.9-2007.9 Ocean University of China, Geology, Bachelor

Work Experience:

2014.11-Present Hohai University

Research Interests:

Hydrodynamic and sediment transport in the East China Seas

Professional Memberships / Awards:

Coastal Education & Research Foundation (CERF) membership

Selected publications or research projects:

(1) **Chunyan Zhou**, Jinhai Zheng*, Ping Dong, Jisheng Zhang, Yuliang Zhu, Zhiheng Zhang. Tidal evolution in the Yellow and East China Sea during Holocene. Journal of Coastal Research, 2016, SI 75:785-789

(2) **Chunyan Zhou**, Ping Dong*, Guangxue Li. Hydrodynamic Processes and Their Impacts on the Mud Deposit in the Southern Yellow Sea. Marine Geology. 2015, 360: 1-16.doi:10.1016/j.margeo.2014.11.012.

(3) **Chunyan Zhou**, Ping Dong*, Guangxue Li. A numerical study on the density driven circulation in the Yellow Sea Cold Water Mass. Journal of Ocean University of China, 2015, 14(3): 457-463.

(4) **Chunyan Zhou**, Guangxue Li*, Ping Dong, Jinghao Shi, Jishang Xu. An experimental study of seabed responses around a marine pipeline under wave and current conditions, Ocean Engineering, 2011, 38(1): 226-234.

(5) **Chunyan Zhou**, Study on the Hydrodynamic Processes and Mud Deposit in the Southern Yellow Sea, Hohai University Press, 2015.

ABSTRACT

P1： Coastal Engineering and Disaster

P2： Marine Energy

P3： Ocean Engineering

Coastal Engineering and Disaster

Remote Typhoon as a Mechanism for Freak Waves

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ABSTRACT:

Previous studies confirm the importance of nonlinear evolution of wave groups and 1-D coalenscence. However, it is observed that all the three most hazardous freak wave incidents are related to remote typhoons and hence a remote new weather system should be considered as a new mechanism for freak wave generation.

An idealized thought experiment has shown how the wave field may change when swells generated by a remote weather system added on a short wind wave field: The significant wave period $T_{1/3}$ increases significantly, but the significant wave height $H_{1/3}$ does not change much. Because of the additional long swells, the highest wave in the new wave field will increase, while the significant wave height $H_{1/3}$ is almost the same. That implies the chance of freak wave will increase, thus explains why all the three most hazardous freak wave incidents are related to remote typhoons.

TYPHOON SWELL PREDICTION AND FREAK WAVE POTENTIAL

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ABSTRACT

The typhoon or hurricane is an atmospheric eddy originated in tropical or subtropical ocean regions. Because the typhoon center always moves, then the wind field becomes non-uniform and non-stationary. Hence, the typhoon wave estimation is more complicated than that of the monsoon. However, the typhoon swell propagates outwards in all directions and reaches the shore earlier. As the typhoon is approaching a site, the swell wave height will be enhanced due to the accumulation of wave energy flux which bears some resemblance to Doppler effect. There are many cases that freak waves cause accidents and damages while typhoons are far away.

There was a perfect evidence for the typhoon swell Doppler effect (Liang, 2003). In August, 1995 typhoon Hent struck Taiwan. The typhoon center passed through the area. A wave station was installed by Central Weather Bureau (CWB) at Tungchi, a small island in the Taiwan Strait(Figure 1). the swell height rapidly increased from 1 m at 21 h, August 30 to 4.6m at 04 h, August 31. At 05 h, August 31 the wave height dropped suddenly to 2.78m. The wave period was maintained at about 10 s and the wind speeds were rather low until 02 h, August 31. The waves measured during this time were the typhoon swell. The low swell height at the initial stage was due to the sheltering effect of the southern part of Taiwan Island. The quick growth in the swell height and sudden drop is perfect evidence of the Doppler effect. The turning point in the high wave swells was between 04-05 h, August 31. From the geographical point of view, the turning point is when a typhoon changes from approaching to leaving. The assumption of the proposed typhoon swell prediction method is that the typhoon wave field is considered as a point source. The wave at the typhoon center is estimated by Bretschneider's parameter method. Empirical constants are obtained from measurements in Taiwan. The swell period will be longer, when the typhoon is more remote. The long wave is dangerous for the rock fishing, because the long wave can generate higher run-up and result to a larger backwash. However, the typhoon swell freak wave cannot be predicted but its potential can be alarmed.

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KEYWORD: Typhoon swell prediction; Doppler effect; Freak wave potential

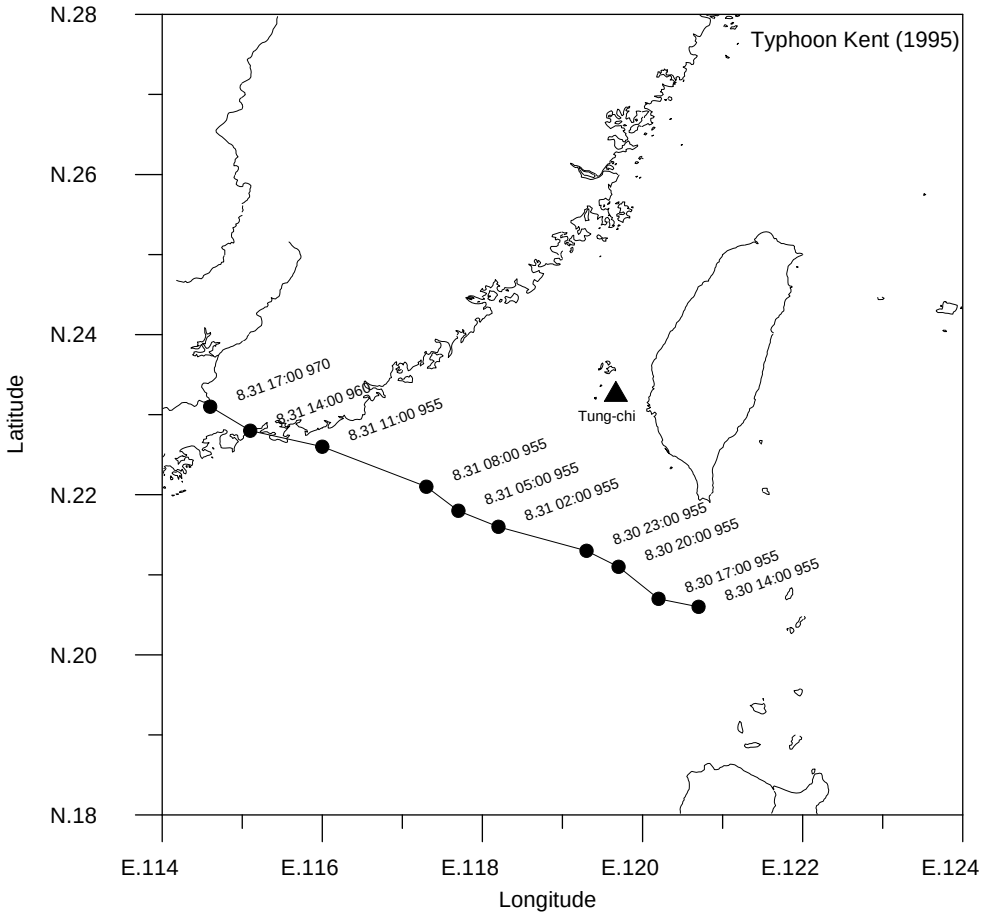

Fig.1 Track of Typhoon Kent (1995)

Uncertainty Analysis of Wave Climate in China Sea

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ABSTRACT:
Wave climate plays an important role in the risk assessment of coastal or offshore engineering. In order to investigate wave climate of China sea, an oceanic wave model is established based on WAVEWATCH III and is further validated against buoy data and altimeter wave data. Based on the model results, the uncertainty of the wave climate in China sea is evaluated concluding that the vast China sea is highlighted with different types of wave climate, mainly caused by different weight contribution of typhoon and monsoon. Several prevalent extreme value theories (EVT) is applied to calculate return period wave parameters providing a basic background dataset for risk assessment. The analyzing results of this paper is helpful for the estimation of wave energy potential in the China sea.

KEYWORD:Wave climate, WAVEWATCH III, uncertainty analysis , extreme value theory, wave energy potential.

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Analysis and prediction of nonlinear dispersion of long-period waves in shallow water

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Keywords: nonlinear Fourier transform, inverse scattering transform, harmonic generation, soliton fission, nonlinear wave dispersion, nonlinear wave-wave interactions, cnoidal waves, nonlinear wave propagation

Abstract:

Long waves can propagate in deeper waters as stable waves without changes in shape. When these deep-water waves enter shallower water conditions such as the continental shelves or the coastal regions then suddenly, this formerly stable waves are transformed into transient waves with a larger number of underlying wave components. These new spectral nonlinear basic components propagate as free waves with different frequencies and different velocities. Hence, the formerly stable shape of the long-period wave will change due to the dispersion of the different spectral components, and the free surface will show additional wave crests. The observed free surface is generated by the superposition of these nonlinear basic components which are phase-shifted now, and their mutual wave-wave interactions. The latter can significantly influence the shape of the free surface. Brühl (2014) has shown that the nonlinear superposition of a number of solitons can provide a transient cosine-shaped free surface. And vice versa, a long-period cosine wave generated in shallow-water can evolve in the wave flume into a train of rank-ordered solitons. As a result, the observed wave crest height of the initial cosine-shaped wave increased from $a=2.5cm$ by a factor of three to the wave crest height of about $a=7.5cm$ for the resulting leading soliton. This wave height amplification was observed in the wave flume over a flat bottom without the effect of wave refraction and shoaling effects over sloped bottoms.

The propagation of waves in shallow-water with $k/h<1.36$ is governed by the Korteweg-deVries equations (KdV). The nonlinear Fourier transform (KdV-NLFT) as implemented and applied in Brühl (2014) provides the solution of the KdV equation and decomposes a given shallow-water wave signal into the underlying nonlinear cnoidal wave (which are the spectral basis of the decomposition) and their nonlinear wave-wave interaction. The superposition of these cnoidal wave and their interactions returns the analysed signal. By solving the KdV equation, the KdV-NLFT only considers those cnoidal waves for the decomposition of the initial long-period transient wave that are real physical waves in the given water depth (oscillatory waves and/or solitons). Once the spectral basis is determined, these waves can be evolved in space and time and the local nonlinear interactions at a desired position can be calculated in order to obtain the expected nonlinear free surface there. By regarding the incident long-period wave as a transient after entering a reduced water depth, shallow-water processes such as harmonic generation and soliton fission can be explained simply by the dispersion of the underlying nonlinear cnoidal waves that generate the transient long-period waves.

In order to better understand the physical background of transient wave propagation and nonlinear dispersion, systematic KdV-NLFT analyses of long-period waves with different heights and periods in different water depths will be presented and discussed at the symposium. The objective is to better predict the transformation and amplification of the wave height of incident long-period waves that

enter shallow-water coastal regions, and to better understand shallow-water effects such as harmonic generation, soliton fission, coastal rogue waves, sneaker waves and tsunami shoaling.

References:

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STUDY ON SOLITARY-WAVE SEPARATION FROM A BOTTOM-MOUNTED PLATE WITH DIFFERENT TOP SHAPES

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ABSTRACT

Wave deformation caused by natural terrain or artificial breakwaters is an important issue in ocean engineering. Wave force can threaten the safety of structures. The stability of structural foundations is related to wave-induced currents in the vicinity of structures. To analyze the influence of a solitary wave on vortex flow patterns, this study investigates the interaction of the wave with a vertical thin plate with different top shapes. Most studies related to vertically mounted barriers are based on the potential flow theory focusing on wave deformation. The streamfunction–vorticity free-surface (SVFS) model is applied together with a boundary-fitted grid to determine wave–plate interaction problems. The SVFS model is a fully nonlinear, viscous wave model. Emphasis is placed on the flow-field motion around the plate. The flow patterns obtained using the numerical solutions in this study are compared with existing experimental observations and are found to exhibit good agreement. In addition, differences in vortical flow patterns along the top shape of the plate are discussed. Results show that even a slight modification of the plate top significantly influences flow conditions.

To date, few studies have contributed detailed analyses of the solitary-wave scattering of reflection and transmission waves and vortical flow patterns with respect to the influence of the incident wave height and plate height. This study applies the SVFS model developed by Tang and Chang (1998). The SVFS model grid is constructed using boundary-fitted nets, and the coupled streamfunction and vorticity in flow fields are solved by the finite analytic method. Finite width of the plate is considered, and the streamline patterns are compared with Lin et al.'s (2005) particle-tracing images, good qualitative comparisons are found.

Keywords: solitary wave, vortex flow, stream function, vorticity, particle tracing

RESULTS

The SVFS model is convenient for showing the streamline scenarios. The particle-tracing experiment is an alternative for showing the stream patterns. We compare them at two instances in Figure 1. One is at t = 13 to show the vortex generation phenomenon and the other at phase t = 29 to illustrate the vortex diffusion stage. The streamline pattern also shows the flow separation generating a vortex at the plate top at t = 13. After t = 29, the primary anti-clockwise vortex is diffused behind the plate and occupies almost the whole water depth. In addition, an anti-clockwise vortex generated above the plate interacts with the primary vortex forming an asymmetric pair of upward-lifting vortices. Overall, the numerical vortical-flow patterns are in good agreements with the experimental visualizations.

During this research, it was interesting to see the influence of the top shape of the plate. Figure 2 shows the same instances and the same contour distributions in a local view around the plates for different top shapes. From these figures, it is found that a small adjustment can have significant influence on vortex evolution. The three-column plots show the results for the left-sharpened, flat-topped, and right-sharpened plates. The left-sharpen top develops a smaller primary vortex behind the plate, and its core is lower than the other two. The flat and right-sharpened plates separate the flow at the front tip to create an arch-up primary vortex. If a wider flat plate becomes a rectangular block, the flow is separated at both the front and rear convex corners. The right-sharpened top creates flow separation at the tip corner. Differing major patterns appear in the pair of upward vortices, for the right-sharpened type the vortices lift upwards more vertically than the others. The right-sharpened space allows the primary vortex to tilt to the left.

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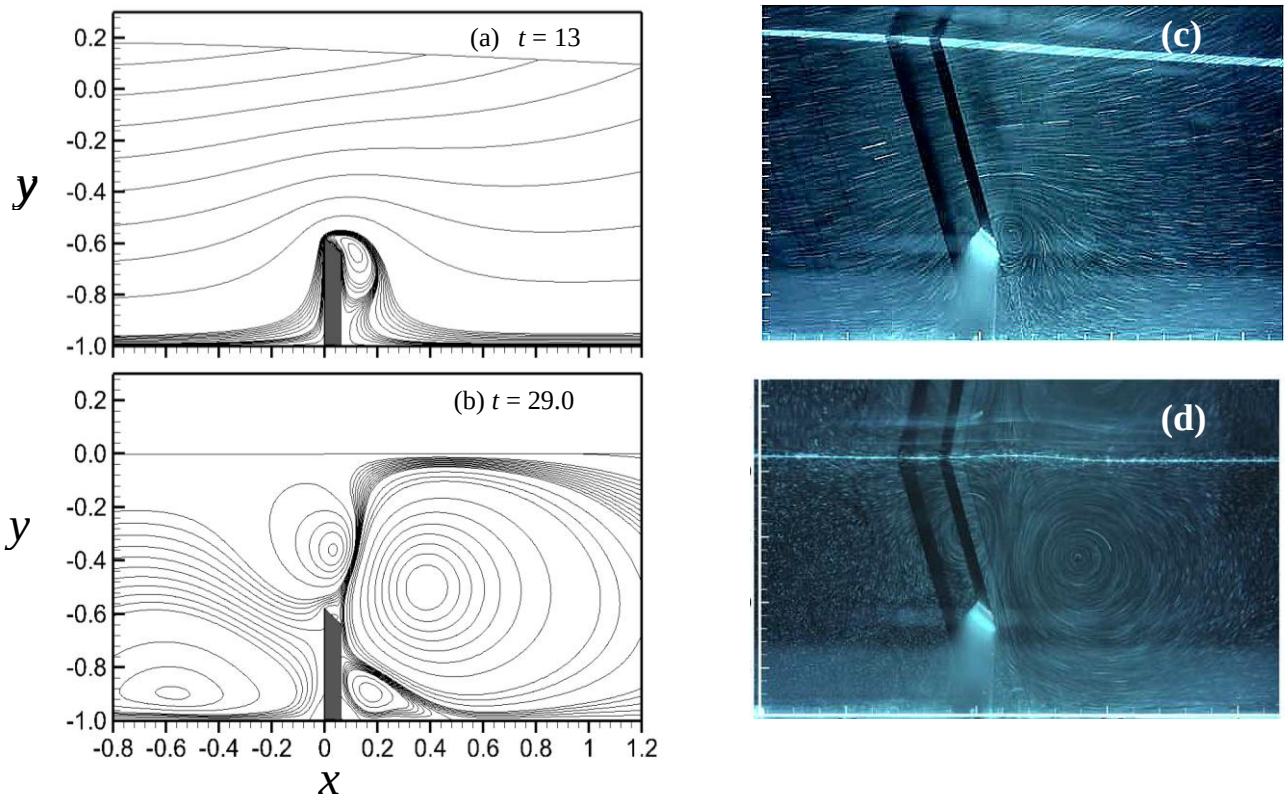

Figure 1 Comparison of vortical patterns from present numerical simulation and particle-tracing experimental observation [2]

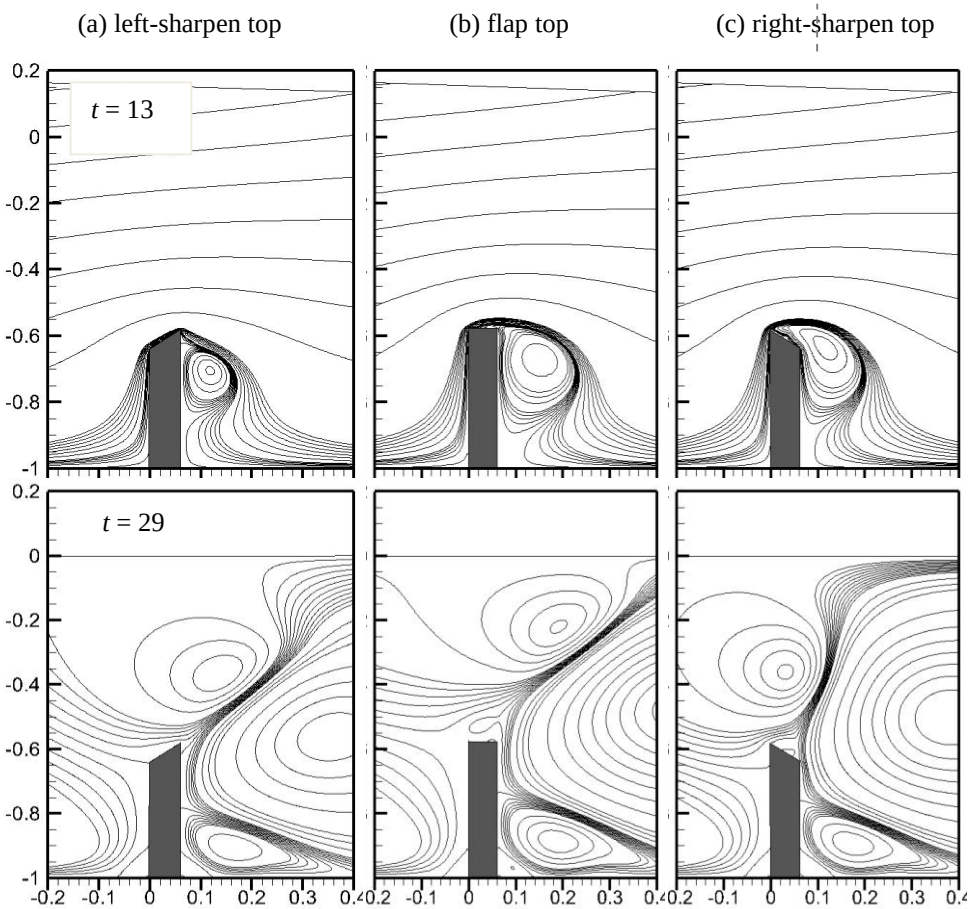

Figure 2 Comparison of numerically-derived streamline patterns of three tip-type barriers.

Field Measurements oF ESTUARINE CIRCULATION In the Yellow RIVER (Huanghe) Estuary

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ABSTRACT

The Yellow River (Huanghe) Delta is a morphodynamically highly active environment subjected to both variable natural boundary conditions and anthropogenic influence. Among the rivers unique features is the high concentration of suspended sediments, which amounts to an average of 8.8 g/l (Yu et al., 2013). However, since the construction of numerous dams in the lower reaches of the river and their operation for discharge control, high concentrations of suspended sediment are limited to the periods of reservoir flushing during the months of June to September.

The joint research project DELIGHT (http://www.delight.eoc.dlr.de/en) focusses on building an integrated management system for the Yellow River Delta region. Within the framework of the project, a 3D morphodynamical model of the estuarine stretch of the Yellow River was set up to investigate the impact of climate change and storm surges on the estuarine conditions (Jordan et al., 2015).

In November 2015, field measurements were performed along a 15 km stretch of the estuary to gain better understanding of the local hydrodynamics, morphodynamics and estuarine circulation. The data sets collected during the campaign serve as basis for the validation and operation of the existing numerical model. Parameters measured during the field campaign include water depth and bottom stratification by means of a parametric subsurface sediment echo sounder, flow velocity and discharge by means of ADCP as well as temperature, salinity and suspended sediment concentration (SSC) by means of a CTD probe.

Preliminary results allow the classification of the estuary as a highly stratified salt-wedge type. While well-mixed conditions prevail in the fluvial part of the estuary, stratification occurs along a 2 km stretch close to the river mouth. In this section, vertical salinity gradients reached up to 20 PSU within an average water depth of 1-2 m. Suspended sediment concentrations generally did not exceed 1.0 g/l during the measurements. A shear front between turbid fluvial water and clear seawater, which could be found during a previous campaign in October 2013 (Lojek et al., 2015), did not occur.

Measurements were also conducted at four stations around the river mouth (see Fig. 1) for a complete tidal cycle (from 11:00 am to 23:00 pm on November 9th). The water depths of the four stations are 5.0 m, 11.0 m, 13.0 m and 14.0 m, for stations A01-A04, respectively. During the measurement time, sediment concentrations are between 0.28-0.52 g/l at A01, and 0.10-0.45 g/l at A02. While for A03 and A04, the concentrations are much lower, between 0.06-0.20 g/l and 0.02-0.12 g/l, respectively. Generally the sediment concentrations showed rapid decrease with the distance to the river mouth. Concentrations at A02 and A03 follow a similar trend with A01, indicating they are influenced by the sediment load from the river mouth. No clear correlations between A04 and A01 can be found, implying that the sediment concentrations at A04 are mainly locally re-suspended or advected from nearby shallow areas.

Figure 1. Locations of measurements on Nov. 9th, 2015.

KEYWORDS:YELLOW RIVER, FIELD MEASUREMENTS, ESTUARINE CIRCULATION, SEDIMENT DYNAMICS

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Bearing capacity and failure mechanism of suction bucket foundation with bulkheads

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ABSTRACT:
Suction bucket foundation is a type of foundation, which looks like an inverted bucket. Its skirts are penetrated into the seabed by self-weight of the structure and negative pressures applied inside the skirt compartment. The structure has the advantages of convenience and celerity in construction, relative low cost and easy recycle. The suction bucket foundations are suitable for soft clay and have a broad application prospects in coastal and ocean engineering, such as docks, cofferdams, breakwaters, offshore platforms and wind turbines. Furtherly, the suction bucket foundation can be divided into four compartments by the cruciform bulkheads. Meanwhile, a bleeder valve is set on the cover plate of every compartment. The suction bucket foundation with four bulkheads has good perpendicular during floating transportation and sinking into soft clay under negative pressures, because the input and output of air and water through each bleeder valve can be adjusted respectively. At the same time, the suction bucket foundation with four bulkheads has better capacity than that without bulkheads under certain conditions. But a systematic study about the effects of the cruciform bulkheads on the bearing capacity of suction bucket foundations has not been carried out. Finite element models about the suction bucket foundation with and without the cruciform bulkheads and solid embedded circular foundations were established in this study. The effects of bulkheads on the bearing capacity and failure mechanism of suction bucket foundation under different embedment ratios and soil strength heterogeneities were studied. The results show that bearing capacities of suction bucket foundations with various embedment ratios are basically unaffected by internal bulkheads in uniform soil. By contrast, the bearing capacities of suction bucket foundations with the cruciform bulkheads, especially for uniaxial moment and horizontal loads, are larger than that without the cruciform bulkheads in soft clay with strength heterogeneities. And it is especially obvious for suction bucket foundations with low embedment ratio and soils with high strength heterogeneity.

KEYWORD: Suction bucket foundation; Bearing capacity; Failure mechanism; Bulkheads; Soft clay

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An Improved Method for Estimating the Most Unfavorable Load Case Combinations on Significant Components of Frame-Type Wharfs under Large Water Level Fluctuations

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ABSTRACT:

An improved searching method was proposed for evaluating the most unfavorable load case combinations on significant components of frame-type wharfs under adverse conditions with large water level fluctuations. The theoretical principles, flow charts and implementation procedures of this method were elaborated by a case study on a representative frame-type wharf project. The most unfavorable load case combinations of 4 types significant wharf components, such as piles, columns, beams, braces were calculated, while the predominant variable loads and the most critical finite element numbers of these components were determined according to this method. It was shown that, by applying the presented searching algorithm, the number of the most unfavorable load case combinations for these vital components of frame-type wharf can be solved as 17 from the original quantities of more than 4.8 billion, and thus significantly reduces the workload in structural design. This improved searching method can provide powerful technical supports for the evaluation of mechanical performance and optimization research of frame-type wharfs under large water level fluctuations.

KEYWORD: an improved method; significant components of frame-type wharfs; large water level fluctuations; the most unfavorable load case combinations; predominant variable load

Numerical investigation of the strong nonlinear wave forces on a vertical cylinder

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ABSTRACT:
The calculation of the wave forces on offshore structures induced by strong nonlinear waves is one challenging issue in the ocean engineering, which is beyond the linear wave theory, and some methods, for example the Morison formula, are inapplicable or needed to be improved. Observations have revealed the higher-order harmonic wave forces on structures and complex wave motions around the structures. The present paper is contributed to investigate the interaction between strong nonlinear waves and one single vertical cylinder by means of numerical simulations. A numerical wave tank is established by solving the two-phase incompressible Navier–Stokes equations provided by the open sources software OpenFoam. The finite volume method (FVM) is used for space discretization and implicit Euler scheme is applied for time integration. The free surface is captured using VOF method. The pressure-velocity coupling is solved by merged PISO-SIMPLE (PIMPLE) algorithm. The numerical model has been validated by experimental results for the wave generation technique and the wave force. A very strong nonlinear wave is specified to study the complex dynamics during the wave wrapping of one single vertical cylinder. The change of higher-order harmonic wave force along the cylinder is carefully analyzed. Special attention is focused on the secondary load cycle. The effects of the wave steep and the diameter of a cylinder on the secondary load cycle are deeply analyzed. The results show that the dimensionless secondary load cycle decreases with the wave steep decreasing and increases with the cylinder diameter decreasing.

Fig. 1 and Fig. 2 show the time histories of surface elevation and in-line force. The excellent agreements show that the numerical model works well in the investigation of strong nonlinear wave force on a cylinder.

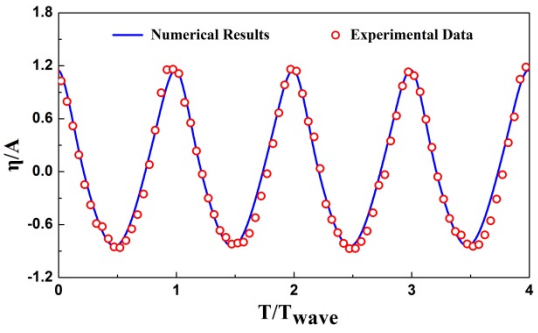

Fig. 1 Time histories of surface elevation

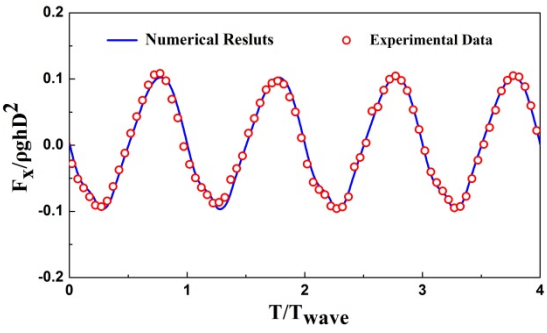

Fig.2 Time histories of wave force on a cylinder

Fig. 3 shows the strong nonlinear motion of free surface near a cylinder which is probed to be the cause of secondary load cycle.

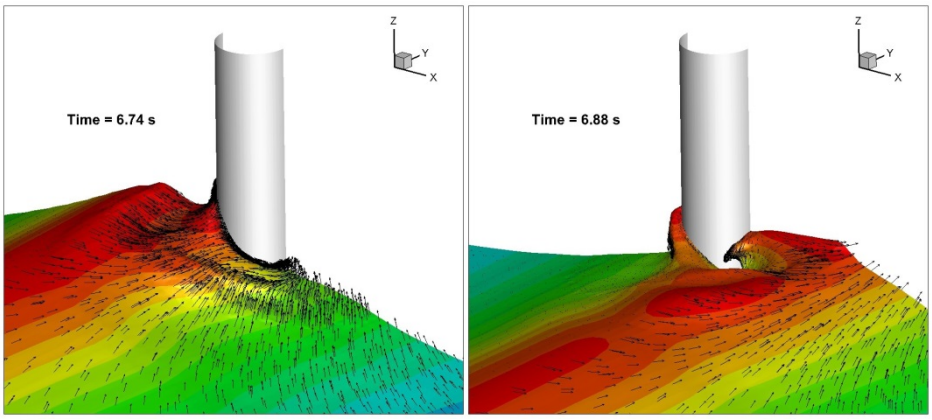

Fig. 3 The strong nonlinear motion of free surface near a cylinder

Fig. 4 show the time histories of wave force in different of positions of the cylinder. The result shows that the magnitude of secondary load cycle decreases when the position moves from surface to the bottom.

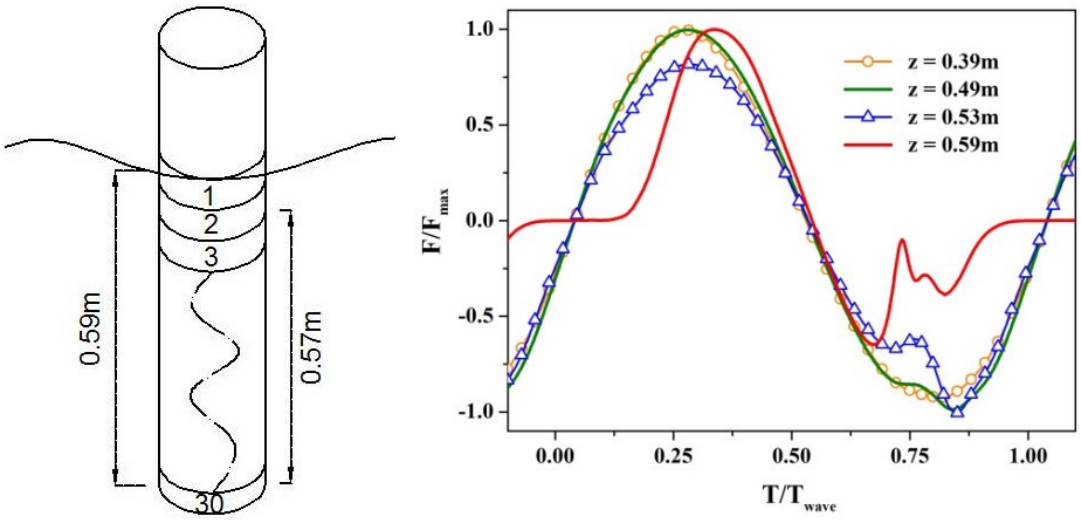

Fig. 4 The change of highr-order harmonic wave fore along a cylinder

KEYWORD:steep wave; strong nonlinearity; secondary load cycle;

Numerical study on the morphological changes of Dongsha Islands under the impact of typhoons

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ABSTRACT:

Dongsha Islands are located in the south China Sea. Statistics of frequency of typhoon across to Dongsha Islands, typhoons have laregest impact to the Dongsha Islands. CWB category 9 paths for typhoons striking Taiwan are based on the past 115 years' records (Jan.1897-Sep.2012). A typhoon is a more common occurrence in summer and autumn and is a less common occurrence in winter and spring.

According to the annual typhoon reports of the CWB, the first typhoon of the year struck Taiwan in April, and the last typhoon appeared in December. From 1897 to 2012, typhoons struck Taiwan 418 times. August had the highest number of typhoons, accounting for 30.62% of the total typhoons over the year; July had 96 typhoons, the second highest number, accounting for 22.79% of the total number of typhoons. Because typhoons usually turn north to Japan after September, few typhoons strike Taiwan in this period (December to March of the following year).

To investigate the effect of the external forces contributing to this terrain, the SW, HD and ST modules of MIKE21 are used in this study area. The two-dimensional MIKE 21 model is used to calculate the wave and current pattern. The main mechanism of the geomorphological changes of the sea area near Dongsha Islands is investigated in this study.

From the simulation result, the objective of this paper is to investigate the topographic change of the coast of Dongsha Islands, meanwhile, topographic scouring study was performed based on category 5 of typhoons and related actions such as tide, wave and water currents.Under the impact of category 5 Typhooni, the entire affect area is north coast and south coast and similar eroded phenomenon, however, in the offshore site of northeast coast, there is slight sedimentation.

The trapping mechanism for tsunami over the circular island with power function profiles

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ABSTRACT:

Tsunamis can be trapped by islands due to wave refraction, and these trapped waves will cause huge damage even in the sheltered opposite shoreline of the island.

Based on the linear ray theory, analytic solutions for trapped wave over a circular island are derived. The depth profile of the island is described by an arbitrary power function with an independent parameter α. That all waves propagating into the topography finally reach the coastline is called perfect trapped modes, whereas that any part of waves escaping from the topography is called leaky wave modes. Whether there are trapped or leaky modes is dependent on the depth profile of the island. For the island with power function profile, the wave pattern is determined by the beach slope. Based on the ray theory, wave amplitudes are related with the ray density. Crowded rays lead to large wave amplitudes while sparse rays lead to small wave amplitudes, and the largest wave amplitudes appears at the cross. Wave amplitudes distributions over the island topography are revealed based on thus property.

More part waves over the topography are captured by the steep topography. The criterion to determine whether waves can be prefect trapped by the island topography is put forward. When the slope at the topography toe is greater than twice ratio of the water depth to the radial distances r_1, perfect trapped modes occur. If the radius of coastline r_0 is small compared to the island toe radius r_1, and the beach slope is also large, the amplitudes can be so large as to cause a disaster on the island.

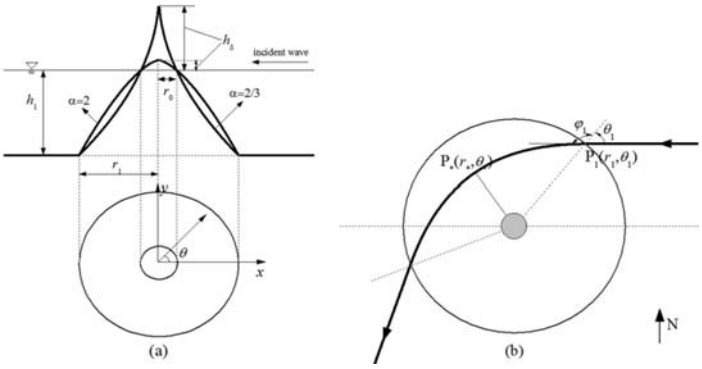

Figure 1. (a) Definition sketh of the island with power function profile; (b) An incident ray over island.

Introduction to the OUC's Research Activities toward the Operational Coastal Morphology Prediction System

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ABSTRACT:
Engineering College of Ocean University of China (OUC) is carrying out an ambitious research for the development of the operational process based morphology prediction system. The first step is to validate the existing model and to develop more realistic one based on the observation data. We had carried out a laboratory experiment last year at the 2-D Wave Flume to measure the detailed time and spatial evolution of the bed profiles and to estimate the cross-shore sediment transport rates for different bed and wave conditions. We are also developing process based sediment transport and morphology prediction model based on the results of the experiment data by extending the previously developed fine sediment transport model for the Yellow Sea.

Based on the experiences of the previous laboratory experiment, rather comprehensive laboratory experiment is designed and being prepared to include the detailed measurement of the suspended sediment concentration together with the evolution of the bed level to be able to estimate the wave-resolving local erosion and deposition rates as well as the cross-shore bed-load and suspended-load transport rates. The prediction models presently used in coastal engineering practices are to be evaluated and improved through a series of laboratory experiment and their data analysis, which will be also introduced and discussed in rather detail at the Symposium.

KEYWORD:Swash-zone; Laboratory Experiment; Sediment transport; Coastal Modeling System; Morphology prediction

Introduction of the In-situ Real Time Nearshore Monitoring Technique- The ARGUS System

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ABSTRACT:

Traditional field survey techniques used in coastal engineering studies carry out in-situ measurement at some specified locations within a certain time period. Such measurements could only provide information with limited spatial and temporal resolutions on the relevant physical parameters, such as wave height, water depth, flow velocity, etc, which are far away from the requirement both for the model verification and the engineering practice. Recently, various in-situ real time nearshore monitoring techniques, based on the remote sensing technique, was introduced. Among which, the shore-based video imagery technique (the ARGUS system) attracts the most coastal researchers' attention. The ARGUS technique was first introduced in 1980s (Holman and Stanley, 2007), which can obtain the large-area and long-period measurement data of different dynamic physical parameters in the nearshore region, e.g., wave, current, shoreline position, and bathymetry features. In this paper, a general review of the ARGUS system and its application was conducted, including its development statue, video data classification and characterization, and various image analyzing approaches. Several practical applications were presented to demonstrate the feasibility and applicability of this technique, including both the short-term event-driven coastal dynamic process and the long-term gradually changed nearshore evolution. Attentions were paid to the corresponding hydro- and morpho-dynamic parameters/processes recorded through the ARGUS system and revealed from the successive image analysis , such as the shoreline changes, bathymetry variation, as well as its physical insights (dynamic mechanisms) behind the phenomena. On the other hand, the first ARGUS system deployed in China was also briefly described, which is installed in Zhoushan, Zhejiang Province. It is expected that application of this nearshore video monitoring technique in China could be further popularized to provide the scientific insight and support for integrated management/utilization and suitable development/planning in coastal region. Meanwhile, it could promote the interdisciplinary studies among various research fields, e.g., coastal engineering, remote sensing, spatial information and image analysis.

A Fuzzy Grounding Alert System for Vessel Traffic Service via 3D Marine GIS

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ABSTRACT:

How to prevent vessels grounding when it sailing along near offshore or harbor area is an intensive discussion issue since the grounding accident always cause oil pollution for coastline areas. This study used a Marine Geographic Information System (MGIS) by surveying 3D seabed topography and geology in order to build a novel virtual aid to navigation model with a grounding alert. Dynamic and static data were provided by using the Automatic Identification System (AIS) as the input, and fuzzy logic control was used for the output. The maximum draft point along the vessel's route was configured as a reference point, and a swath angle of 0°-90° was used to search the seabed topography segments and obtain the Water Depth Swath Angle (WDSA) based on the concept of the compression and dilation equations for time and space. The MGIS was used as the data processing platform. After analysing the professional sailing rule base with the high alert rule base with regard to the security benefit of the hazard alert, an appropriate alert distance was configured. Moreover, AIS/MGIS could be used for XTE (cross track error) calibration. Based on three alert levels (amber, red, and flashing red/alarm), VTS operators and crewmembers can immediately obtain a clear warning to avoid danger zones in advance.

KEYWORD: Grounding Alert; Marine GIS; Fuzzy Logic Control; Danger Alert Angle; Vessel Traffic Service

Study on Berm Deformation Affected by Submerged Breakwater during Storm Wave

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ABSTRACT:

In the past time, humanities built seawalls to against the wave incursion and wave surge in Taiwan or somewhere. Nevertheless, it seems inadequate strategies that construct seawalls as the only line of wave protection, because of the toe scouring, disappearance of beaches and elimination of visitor willing. A sandy beach with a wide berm and a high dune will provides storm protection and damage reduction, recreational and economic benefits and biological habitats for plants and animals (Coastal Engineering Manual 2003).

In view of the fact that the seawall is exists in many countries, a beach with wide nourished berm and seawall aim to cure those symptoms which is described in the preceding paragraph. However, a fundamental consideration of implementing a beach nourishment scheme would be an economic argument. There will be an ongoing maintenance requirement to place additional material by influence of natural processes for most schemes and especially in the duration of storm seasons. Therefore, the deformation of berm during the storm waves would be a truly important issue.

In this paper, a movable berm with a rigid sloping seawall was constructed in the laboratory experiment. The measured profiles were produced by several tests of independent storm wave durations. Each test was compared to with and without submerged breakwater which suffered the same storm waves. Six cases and more than 100 tests were conducted in a wave flume to investigate berm deformation which influenced by submerged breakwater. *Ds* was the depth deviation of each case to the normal water level and the relative depth of submerged breakwater was defined as the ratio of crown depth *R* in this paper. For the results of these experiments, the case with submerged breakwater (*R*/*Ds*=1/3) was able to reduce 80% distance of recession on the berm. However, in the cases of *R/Ds*=2/3 and 3/3, the effects of submerged breakwater were no longer well, in which the case of *R/Ds*=2/3 and 3/3 were reduce only about 10% and 20% distance of recession respectively. However, there were formed sandy bar at the toe of nourished berm in the both cases of *R*/*Ds* =1/3 and 2/3. Subsequently, with the storm surge increasing from *R*/*Ds* =1/3 to 3/3, the accumulation in the toe of seawall would be more significant.

KEYWORD: seawall, berm,submerged breakwater, irregular wave, movable bed, ripple.

A Study on the Swell and Wind Sea Separation Methods

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Abstract

Waves that have propagated out of their generating fetch are identified as swell. Swell significantly affects the offshore structure designs, small boat operations and ship passages over harbor entrance, and surf forecasting. Recently, numerous freak wave accidents occurred in Taiwan have been identified their correlation with swell. It is therefore necessary and interesting to study swell on both scientific and practical purposes. Understanding of ocean swell may help to predict the occurrence of freak wave. The kernel concept of wind sea and swell separation is to decide the separate frequency in spectral domain. This is on the analysis of frequency spectra which is called 1D separation method. Recently, to separate the wind sea and swell components based on directional wave spectrum analysis were proposed, which called 2D separation method. The purpose of this study is going to assess the correctness of various wind-sea and swell separation methods. Field wave data measured at Taiwanese waters are used to exam the methods. A correct and fast method is suggested for operational wave measurement use. In addition, the swell characteristics in Taiwanese waters are presented.

Keywords: separation, wind sea, swell, wave spectrum

Bragg reflection of oblique waves by multiple submerged porous bars near a vertical wall

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ABSTRACT:
Submerged porous bars can provide environmental-friendly protections for coast lines and coastal structures. The wave reflection by multiple submerged bars can be amplified significantly when the incoming wavelength component along the normal direction of the bars is about twice the bar spacing. This is the so-called Bragg reflection of water waves by submerged bars. This study examines the Bragg reflection of oblique waves by multiple submerged porous bars with a leeside vertical wall. The sidewall is used to represent the reflection effect of vertical seawalls or steep coastal cliffs.

Based on the potential theory and the classical porous medium model of Sollitt and Cross (Coastal Engineering Proceedings, 1972, pp. 1827-1846), we use matched eigenfunction expansion method to develop an analytical solution for the present oblique wave scattering problem. We also use the multi-domain boundary element method (BEM) to develop a numerical solution for this problem. In the BEM solution, the modified Bessel function of the second kind of zero order is adopted as the fundamental solution of the governing equation (the modified Helmholtz equation). The analytical solution and the multi-domain BEM solution are compared for cross-checking. The reflection coefficient of porous bars and the wave run-up on sidewall are carefully examined by numerical examples. The effect of the sidewall on the Bragg reflection by porous bars is clarified. Significant results for practical engineering are presented.

KEYWORD: Submerged porous bars; Sidewall; Oblique wave; Bragg reflection.

Long-term morphological change and its causes in Pearl River Estuary, China

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ABSTRACT:

Bathymetric charts, underwater Digital Elevaion Models (DEM), remote sensing data and Geographic information Systems (GIS) were applied to calculate and analyse the morphological changes in the Pearl River Delta (PRD). Based on the Multi-temporal stallite imges and topographical data, the cosatline developments were quantified and analyzed through RS-GIS integration technology. The results show that coastline exteneded seaward by 579.2m on average with a net extension rate of 19.3 m/yr between 1976 and 2006. During this period, the coastline extendsion also displays a rapidly increasing trend, which has significant impacts on morphological changes. It is found that coastline extends in most regions due to land reclamation except Jitimen subregion which experience a reduction of the coastline length with an increasing area of land.An underwater Digital Elevation Models of the PRD was built for the quantitative analysis of the isobaths changes, the accretion-erosion evolutions and the changes in sediment volumes. During the period roughly between 1970 and 2010, about 9.45×105 km3 sediment were transported into the PRD above 10-m isobath, which means the average sedimentation rate was approximately 3.15×104/yr. Mophological change analysis indicates that, in the eastern region of the PRD, the Lingding Bay maintained an under water topography characterized by a “three shoals and two trouhhs” pattern. In the middle region, the Modaomen Waterway experienced substantial erosion while Bailong Waterway was mainly in the state of deposition. In the western region, deposition contunuously occurred in both channels and shoals. The changes in sediment volume indicate that the channels became deeper and narrower, while the shoals change into shallower and larger. Although sea-level rise, subsidence and sediment supply, seem to affect the morphological changes of the PRD to some extend. However, combined with the impacts of anthropogenic activities, it is obvious that above natural factors only have minor impacts on abrupt mophological changes in recent decades. A systematically and detailed comparative analysis indicates that human activities in the PRD, especially land reclamation, are the most dominant factors that control the observed morphologycial changes.

KEYWORD:Morphological change, Pear River Delta, Coastline development, Sediment volumes, Human activities, Land reclamation

Numerical analysis of the nonlinear parameterization of waves in currents over a submerged sill with a non-hydrostatic model

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ABSTRACT:
Non-hydrostatic wave models have shown more and more good potentials on simulating wave transformation from deep to shallow waters. The numerical model SWASH has been extensively verified is a general-purpose numerical tool for simulating non-hydrostatic, free-surface, rotational current and transport phenomena in one, two or three dimensions. The governing equations are the nonlinear shallow water equations including non-hydrostatic pressure and some transport equations.

The variation of nonlinearity of waves over submerged sill or breakwater is a long pursued topic in coastal engineering. Here we investigated the nonlinear parameterization of irregular waves with ambient currents over a sloping sill (Fig. 1) with SWASH. The introductions of SWASH are presented in the first part of this paper. The model verifications of nonlinear parameters of irregular waves interacted with currents crossing submerged breakwater are carried out in the second part of this paper. In the third part of this paper, the variations of nonlinear parameters in the four current velocities of the two opposite current directions are presented. The connections between the nonlinear parameters and the local Ursell number of each current velocity are presented in the fourth part of this paper.

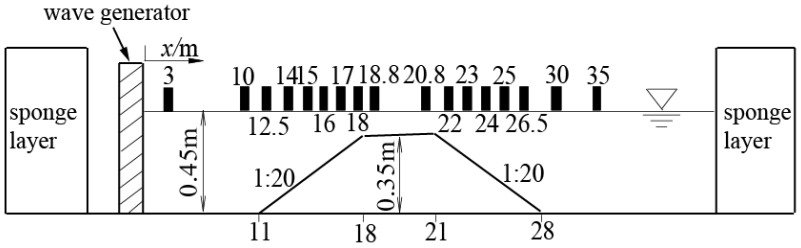

Fig. 1 Sketch of the flume

Investigation of the current velocity and the current direction (following or opposite with waves propagation) effects on the nonlinear transformation of irregular waves was carried out with SWASH. Each direction selects four current velocities (u_0=0.01m/s, u=0.02m/s, u=0.03m/s, u=0.04m/s). The nonlinear parameters (asymmetry, skewness and kurtosis) are estimated by using the wavelet-based bispectrum, and the empirical formulae regarding these nonlinear parameters as a function of the local Ursell number are derived based on the present data measured on each current velocity. In addition, the connections between the nonlinear parameters (asymmetry and skewness) and the local Ursell number of each current velocity are presented in this paper.

In the shoaling area of submerged sill, the nonlinear characteristics of waves is most obvious when

waves propagate in the same direction with currents. In the crest shallow area of submerged breakwater, the stronger current velocity, the more obvious the nonlinear characteristics of waves in the following current; while the nonlinear characteristics of waves grows when waves propagate in the weakening adverse current.

Experimental Study on Interactions Between Bidirectional Wave Trains with a 12º Approaching Angle

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ABSTRACT:

Wave-wave interaction is a key characteristics of ocean gravity waves and relates to many important phenomenon, such as wave breaking and formation of freak waves. Previous studies were mainly focusing on wave interactions of unidirectional and multidirectional waves (Osborne et al., 2000; Smith et al., 2002).

Recently, Liu et al. (2014, 2015) designed an ingenious experiment to study wave breaking. In the experiment, two identical wave trains were performed a simulation of weakly three-dimensional (WTD) breaking waves generated and propagated isolated with an approach angle of 8º and then encountered each other and breaking in an interaction region. The experimental results showed that the WTD experiments have little influence on the profile of wave trains with relatively low initial steepness, although it is pronounced when breaking occurs. For monochromatic wave trains, there is an obvious increase in the wave height at the center of the interaction region (Liu et al., 2014). For focusing wave groups, breaking events could occur with smaller initial steepness and, more interestingly, with lower energy dissipation, compared with the two-dimensional experiments (Liu et al., 2015).

In this study, to further study the WTD effect on wave interactions and the influence of approaching angle, experiments of bidirectional wave trains interactions were undertaken in a “X” configuration with a larger approaching angle of 12º(see Figure 1). Two identical regular waves (with opposite approach directions) were generated by the serpentine wave-maker, and the interactions occurred when they propagated into the interaction region. During the experiments, the surface elevations of the waves were measured by calibrated probes to investigate the interactions of bidirectional wave trains.

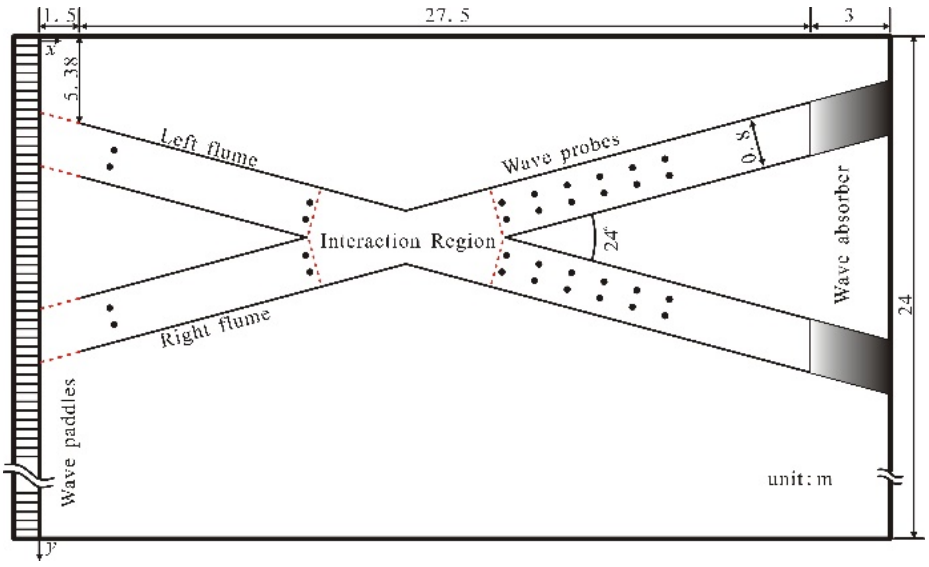

Figure 1. Experimental setup.

By comparing with the experimental results for waves with the smaller approaching angle, the present experimental results shown that the weakly three-dimensional wave interaction is mainly depended on both the approach angle and the initial wave steepness. For wave trains with small steepness, the wave pattern maintains the initial feature in the interaction region. However, the intensity of wave interaction was intensified by increasing initial wave steepness, introducing

significant changes of the wave surface and the wave patterns were no more two-dimensional after the interaction region. During the interaction process, there was an obvious increase in the wave height, reaching to a maximum value at the center of the interaction region. Furthermore, spilling breakers were formed downstream of the center point for steep wave trains. Meanwhile, the intensity of nonlinear interaction is also sensitive to the approaching angle, wave breaking could occur for gentler wave trains in the configuration with the larger approaching angle, suggesting that larger approaching angle can increase the intensity of nonlinear wave interaction.

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Flow velocity and suspended sediment concentration distribution for equilibrium sandbar beach

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ABSTRACT:

This study presents the analysis of flow velocity and suspended sediment concentration distribution in different zones of two kinds of equilibrium sandbar beaches obtained at a large wave flume. The initial beach is a 1:10 slope mobile bed with medium sediment size d_{50} of 0.25mm . The waves include regular and irregular waves. The results show that the equilibrium sandbar profiles under regular and irregular waves are different markedly. For regular wave, The equilibrium profile has a bigger sandbar near the breaking point and a smaller sandbar shoreward of the trough. For irregular wave, there are a bigger sandbar near the breaking point of the wave with the maximum wave height and a smaller sandbar near the shoreline. In the swash zone, velocity and suspended sediment concentration are evenly distributed along the water depth. In the surf zone and sandbar zone, velocity displays a parabolic structure, and suspended sediment concentration is exponentially distributed. In the shoaling zone, the flow velocity is very small and is linearly increasing from the bottom up, and the suspended sediment concentration is very small and is exponentially distributed. The flow velocity and suspended sediment concentration in the sandbar zone is larger than in other zones of beach. The suspended sediment transport is offshore in all of the zones of equilibrium sandbar beach for regular and irregular waves conditions. It is explained by the predominance of the undertow in the suspended sediment transport. Because the sandbar beach is a equilibrium profile and the suspended sediment transport is offshore, the bed load transport is shoreward in all of the zones of equilibrium sandbar beach profile. When the wave height increases or decreases 10% or 2cm for regular and irregular waves, the sandbar will migrate shoreward or offshore. The direction of net sediment transport is consistent with the direction of sandbar migration.

KEYWORD:Flow velocity distribution; Suspended sediment concentration distribution; Equilibrium sandbar beach;

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STUDY ON THE COMPUTING METHODS OF MIXED LAYER DEPTH AND GRADATION BASED ON SAND WAVE MOTION

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ABSTRACT:
As for non-uniform sand mathematical models, the determination of mixed layer depth and gradation is of extremely important significance and will directly decide the reliability and accuracy of corresponding computing results. Especially in the computing of reservoir's downstream scouring, mixed layer depth will not only decide watercourse's scouring quantity, but will affect relevant scour velocity and scour trend. As an important riverbed form, sand wave will move in accompany with the exchange of bed materials and its motion can be regarded as a physical background for mixed layer computing. Considering from the physical background of sand wave motion, this paper has derived out the computing methods of mixed layer depth and gradation. On the basis of sufficient indoor and outdoor data, the relation curve between relative wave height and relative velocity is represented in this paper, with curve parameters being matched; besides, based on the physical meanings of mixed layer depth and its relation with sand wave height, the sand wave motion-based computing method of mixed layer depth is derived out. Starting from the concept of mixed layer, it is assumed that the original bed material gradation will be uniform along depth, the porosity remains unchanged before and after scouring and silting, blending layer depth is a constant in the computing period, scoured sediment will be substituted equivalently by original bed materials below blending layer's lower boundary, deposited sediment will lead to equivalent ascending and descending of blending layer's upper and lower boundaries, the mixing will be uniform in the process, etc., and the estimation methods of the sand wave bed's mixed layer under three models are derived out and obtained, including the pure deposition model, the pure scouring model and the coarse-deposition fine-scouring model.

KEYWORD:Sand Wave, Mixed Layer, Depth, Gradation

Modelling the Water Flushing Properties of the Yangtze Estuary and the Adjacent Waters

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ABSTRACT:
As a multi-branch estuary system, the Yangtze Estuary presents distinctive characteristics of hydrodynamic processes under the co-action of the river runoff, tidal fluctuation and gravitational circulation, etc. Here a depth-averaged model which involves passive tracers was applied to the Yangtze Estuary and the adjacent waters. The open boundary condition was supplied by Nao.99 model, and the model was calibrated using the observed velocity and salinity data which was obtained during March 2002. The water age used here was defined as the time that has elapsed since the water parcel under consideration was released into the estuary, which was selected as the diagnostic to study the flushing efficiency of the water body across the estuary. The numerical simulation was conducted in TELEMAC system and the water age was solved in advection-diffusion-reaction equations. The transport properties were investigated under different river discharge scenarios of Datong, which represent season impacts respectively. The age distribution and its relationship with the salinity distribution have also been investigated. Model results showed that the river runoff is one of the dominant factors that influences the spatial distribution of mean age and the distance of salt water intrusion could reach, while the tidal movement also influences the spatial distribution of water age. In addition, the particle tracking algorithm was involved either to analyze the dynamic characteristics of the North Branch and the South Branch. They have different mechanisms, the South Branch is significant as the main water flow passage, while the salt intrusion in North Branch causes backflow and would partly join in the flushing water of the South Branch.

KEYWORD: Numerical modelling, Yangtze Estuary, Age, Salt water intrusion, Particle tracking algorithm

Optimisation of Multi-model Ensemble Wave Forecasting

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ABSTRACT

Accurately forecasting the ocean waves during typhoon events is extremely important to mitigating and minimising the potential damage to the coastal infrastructure and to protecting the coastal communities. This is particularly relevant to the coasts around Taiwan, as annual occurrence and the severity of typhoons are in an increasing trend. However, due to the complex hydro-meteorological interaction and uncertainties arose from different modelling systems, to quantify the uncertainties and improve the forecasting of the typhoon-induced waves still remain challenging. In recent years, ensemble approaches have been widely used to provide further insights into the model behaviours. This paper presents a practical optimisation of the model-ensemble results in attempt to improve the accuracy of the real-time typhoon wave forecasting. In this study, the "locally weighted learning" algorithm is used to optimise the weightings for the wave heights computed by the WAVEWATCH III wave model driven by winds from four different weather models (model-ensembles). The optimised weightings are subsequently used to calculate the resultant wave heights from the model-ensembles. The results show that the optimisation is capable of capturing the different behavioural effects of the different weather models on wave generation. In comparison with the measurements at selected wave buoy locations, the optimised weightings, obtained through a training process, can significantly improve the accuracy of the forecasted wave heights from the standard mean values for the typhoon-induced peak waves. The results also show that the algorithm is easy to implement and practical for real-time wave forecasting.

Keywords: wave modelling; optimization; multi-model ensemble; forecasting; typhoon waves; WAVEWATCH III; locally weighted learning

Development of A Two-Layer Shallow-Water Model for Green Island Vortex Simulations

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ABSTRACT:
Green Island located in the southeastern Taiwan coastal water is the potential Kuroshio power plant site. Location of the Kuroshio power plant site should stay away the influence area of downstream meandering island wakes. Previous study of Green Island wake (Hsu, et al., 2015) showed that a high spatial resolution hydrodynamic model is required to reproduce the downstream vortex streets. In this study, a high resolution two-layer shallow-water model is proposed to study the hydrodynamics of Kuroshio and downstream Green Island wake. The developed model will be applied to simulate the hydrodynamics of Kuroshio and downstream Green Island wakes. This is the preparatory study for extending the single layer shall-water model to the multi-layer one using the sigma coordinate in the vertical direction.

KEYWORD: Green Island Wake, Kuroshio, Shallow Water Equations, Vortex Street.

Effects of obliquely opposing and following currents on wave propagation in a new 3D wave-current basin

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Keywords: wave height; current; wave-current interaction; 3D wave basin

INTRODUCTION & MOTIVATION

The design of structures in coastal and offshore areas and their maintenance are key components of coastal protection. Usually, assessments of processes and loads on coastal structures are derived from experiments with flow and wave parameters in separate physical models. However, Peregrine (1976) already points out that processes in natural shallow coastal waters flow and sea state processes do not occur separately, but influence each other nonlinearly. Kemp & Simons (1982) perform 2D laboratory tests and study the interactions between a turbulent flow and following waves. They highlight the significance of wave-induced changes in the current properties, especially in the mean flow profiles, and draw attention to turbulent fluctuations and bottom shear stresses. Kemp & Simons (1983) also study these processes and features with opposing waves. Studies on the wave-current interaction in three-dimensional space for a certain wave height, wave period and water depth were conducted by MacIver et al. (2006).
The research focus is set on the investigation of long-crested waves on obliquely opposing and following currents in the new 3D wave-current basin (*Fig. 1*).

METHODOLOGY

In a first step the flow analysis without waves is carried out and includes measurements of flow profiles in the sweet spot of the basin at predefined measurement positions. Five measuring points in the water column have been delineated in different water depths in order to obtain vertical flow profiles. For the characterization of the undisturbed flow properties in the basin, an uniformly distributed flow was generated in the wave basin. In the second step wave analysis without current, the unidirectional wave propagation and wave height were investigated for long-crested waves in intermediate wave conditions. In the sweet spot of the wave basin waves with three different wave directions, three wave periods and uniform wave steepness were examined. For evaluation, we applied a common 3D wave analysis method, the Bayesian Directional Spectrum method (BDM). BDM was presented by Hashimoto et al. (1988). Lastly, identification of the wave-current interaction, the results from experiment with simultaneous waves and currents are compared with results for only-currents and only-waves in order to identify and exemplify the significance of nonlinear interaction processes.

Fig. 1: 3D-Wellen-Strömungsbecken

RESULTS

The first results of the wave-current interaction show, as expected, a reduction in the wave height in the direction of flow and an increase in wave heights against the flow with unidirectional monochromatic waves. The superposition of current and orbital velocities cannot be conducted linearly. Furthermore, the results show a current domination for low wave periods and wave domination for larger wave periods.

ACKNOWLEDGEMENT

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Coastal Erosion and Measures at KetzeliauCoast, Taiwan

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ABSTRACT:

This paper examines major factors of coastal erosion and measures against beach erosion at Ketzeliau Coast, Taiwan. Historical shoreline and costal cliff recession as a result of the attack of storm surges and waves were analyzed and discussed. The most important impact of beach erosion at the Ketzeliau Coast includes beach erosion, wave overtopping, coastal flooding, damages of homes built on properties. This study investigates impact of coastal damages and examines various measures adopted in response to coastal erosion during the past 60 years at the Ketzeliau Coast. The improper prevention work of the hard solution of coastal structures against beach erosion is reviewed based on their effectiveness in protecting life, properties, and harmony with the adjacent environment. Alternative defense solutions are suggested to implement and their benefits are addressed at the Ketzeliau Coast.

KEYWORD:coastal cliff, coastal erosion, measures against beach erosion, coastal protection

Experimental Study on the Characteristic of Tsunami Generation by Slumps and Landslides

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ABSTRACT

This study intended to investigate the characteristics and formation of solitary waves cause by landslide movements with physical experiments, which can provide references for related researches and relevant mutual exchange with other researches. Taiwan is located in the plate of polymerization boundary, and is earthquake-prone like Japan. In addition to the tsunami that may arise, it may also produce common effect due to collapse or submarine slide by the earthquake, and thus produce landslide tsunami that will be more destructive to Taiwan-coast since the landslide tsunamis is close to the shore. Various slipping heights H_s, sliding distances L, and sliding mass loads W were adopted in the experiment to explore the generation, variation and discrepancy of the solitary wave under the combination of various conditions with different dynamics (Figs. 1-2). The waveform is more conformity to theoretical results of solitary wave when L= 180 cm, H_s = 22.5 cm, and W= 60 kg, though the generation of tail waves still remains slightly, yet has been reduced to a minimum. Although there are significant differences between the actual tsunami and solitary waves, it can be applied to the early warning mechanism and prediction mode by taking advantage of the long-wave characteristic of solitary waves as a basis for the investigation of tsunamis.

Moreover, based on the previous studies of submerged undulating breakwaters (Shih, 2014a, 2014b) and screen pipe breakwaters (Shih, 2012, 2015), it was found that the pervious pipe breakwater have a good effect of energy dissipation on short period waves and intermediate waves. On the other hand, experimental research revealed that the composite undulating submerged breakwater has good effect of energy dissipation on long waves. The division of solitary wave (Figs. 3-4) and the dissipation of solitary wave energy were also conducted by the combination of these two types of breakwaters. Preliminary study showed that the attenuation of wave energy was determined by the incident wave height and the transmission wave height, indicating that more than 70% (Fig. 5) of the wave energy can be effectively dissipated.

Keywords: Composite undulating breakwater; pipe breakwater; wave dissipation; landslide; solitary wave.

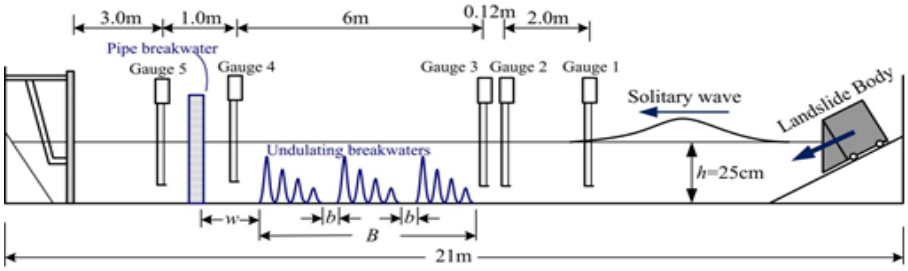

Fig. 1 Schematic layout of wave flume and experimental setup

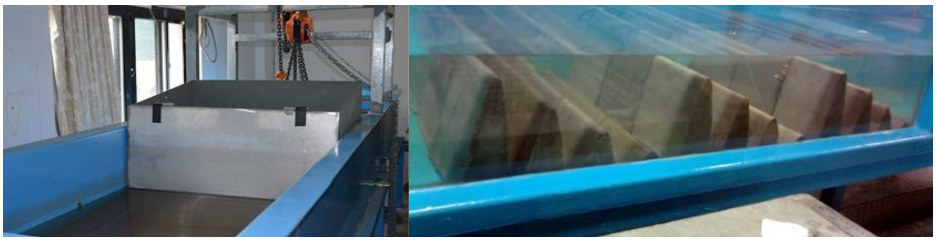

Fig. 2 Experimental Setup

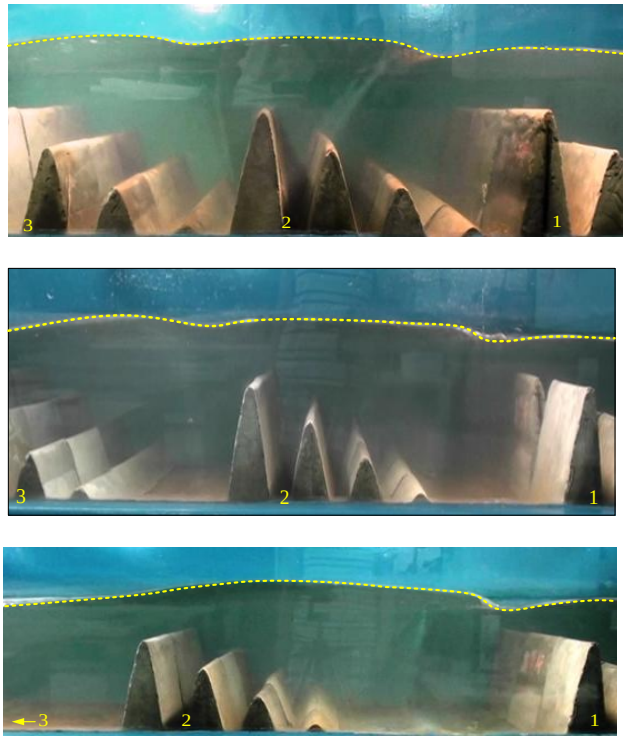

Fig. 3 The division of solitary wave.

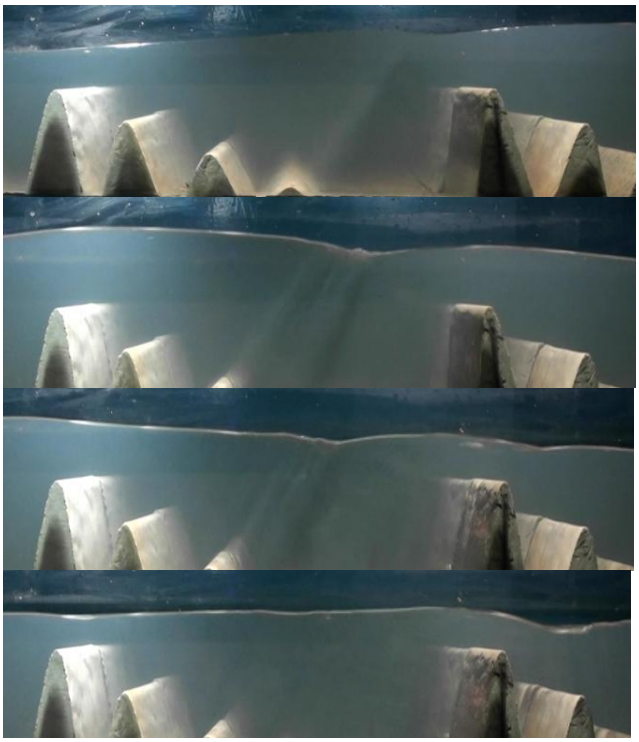

Fig. 4 The waveform variation of solitary wave.

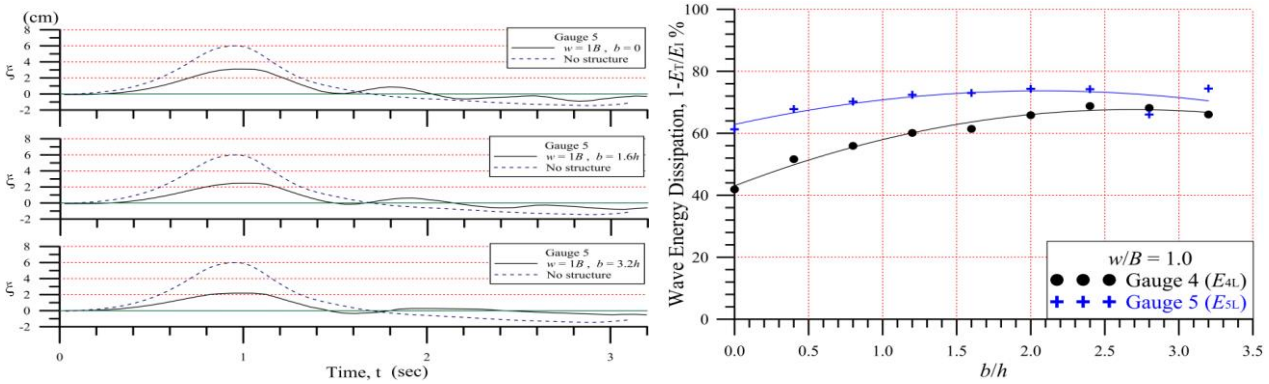

Fig. 5 Wave energy dissipation for $w/B = 1$

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Numerical Study of the Local Scour Around Pipeline in Steady Flow with CFD Model

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ABSTRACT:

To simulate the local scour around pipeline, a scour model based on open source CFD code(OpenFoam) was constructed. Both bed load and suspended load sediment transport model were considered in the scour model. Firstly, the standard N-S equations were solved by the PIMPLE method to get the flow filed information. Then, the bed shear stress based on turbulence models was calculated, where the traditional approximate method based on the assumption that the flow presents a parabolic distribution in vertical was replaced. Then, the sediment transport parameters like bed load transport rate, erosion rate and deposited rate were calculated. Besides, the VOF method was used to capture the free surface, an explicit form was used to discrete the Exner equation and finite area method(FAM) mapped the sediment parameters from three dimensional flow model to two dimension of bed morphology equation. And then, the Laplacian equation was solved to get the displacement of nodes in the computation area and the move mesh method was used to capture the sand bed elevation. To smooth the bed surface for preventing freaky mesh, a mass conservative sand slide model was introduced into the scour model. Last but not least, several cases were chosen to validate the result of bed shear stress model, suspended load model, and scour model, respectively. The result of study shows that the modeled results validated well with the measured data, which means that the constructed scour model can simulate the process of local scour and the maximum equilibrium scour profile accurately.

KEYWORD: Local scour, move mesh method, steady flow

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Development of a sensor-based dike monitoring system for coastal dikes

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Introduction

Sea and estuarine dikes are one of the most important structures when it comes to coastal protection in Germany. Therefore, the implementation of sea dike monitoring systems is of great value in order to improve the reliability of flood protection. The interdisciplinary research project *EarlyDike* attempts to develop an innovative early warning system (EWS), which works – in contrast to existing EWS – not only based on water level forecasts, but also considers wave load, improved storm surge monitoring, and inner dike conditions. The implementation of a web-based Geo-Portal, which integrates the information generated by sensors and numerical simulations, enables decision makers to access reliable real-time data. Thereby, the intended sensor- and risk-based early warning system allows in time warnings and improves present disaster prevention and management. An outline of the project is given in figure 1. Objective of this abstract is to depict the integration of sensor-based dike monitoring, which is part of work package 3.

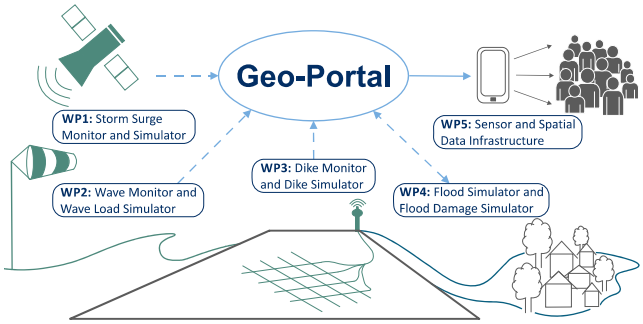

Figure 1: Overview on all work packages (WP) within *EarlyDike*.

Dike monitoring by intelligent geotextiles

Monitoring of sea dikes is commonly performed visually after storm surges. In order to establish the EarlyDike system, a more sophisticated monitoring system, which is able to cover many kilometers of sea dike lengths and supplies the Geo-Portal with real-time data on inner dike conditions, is required.

The monitoring system, which is developed at the *Institute of Hydraulic Engineering and Water Resources Management* at *RWTH Aachen University (IWW)*, is based on the detection of two physical properties: water content and deformation. The identification of these parameters is carried out by smart geotextiles designed in cooperation with the *Institut für Textiltechnik (also RWTH)*. The smart textiles consist of yarn based carbon sensors placed on a geotextile substrate by using embroidery. They can be installed beneath the grass cover on the landward slope of a sea dike where they allow detection of water leakages and identification of areas of reduced stability.

In order to generate digital data on inner dike condition, physical parameters need to be transferred into electrical signals (voltage). Sensors for the determination of water content consist of uninsulated carbon fibers attached in parallel lines to the geotextile. A defined electrical resistance is applied between two fibers each. Once water fills the area between two fibers, electrical resistance is significantly reduced and the voltage signal decreases. Deformation sensors consist of insulated carbon fibers (in order to avoid signal influence by humidity) stitched on the geotextile. The electrical signal is now measured along one sensor fiber only. Once the fiber gets stretched, its electrical properties change. Detected changes in electrical resistance of these fibers can be transferred into length deformation.

Small-scale laboratory tests

In order to test the smart geotextiles, extensive laboratory tests are carried out at the *IWW*. The test program consists of physical models on different scales.

On the smallest scale, tests are performed in a channel of 30 cm height and 30 cm width. A model dike, consisting of a homogenous sand body with a height of 20 cm, is installed in the channel. In the first set-up, 20 prototype carbon sensors, stitched on a 40 cm x 40 cm geotextile, are placed into the landward slope of the model dike. The channel is

filled with water until water level reaches the dike crest; afterwards the water level is kept constant. Without any sealing, the homogenous sand body allows water percolation, and the development of seepage lines can be observed. During the whole experiment, voltage between two carbon fibers each is measured and data collected in order to observe the water percolation through the dike.

Figure 2: Placement of smart geotextile on the landward slope of small-scale dike model.

Figure 2 shows the placement of the geotextile within the model dike, figure 3 water emerging at the landward slope and first steps of backward erosion.

Figure 3: Development of water emersion and sand erosion at landward slope.

Preliminary results of sensor measurements are summarized in figure 4. Channel 2 refers to the sensor pair at the dike toe, channel 10 to the one at the dike crest. Voltage drops at different time steps show the emersion point of the seepage line rising at the landward slope of the dike.

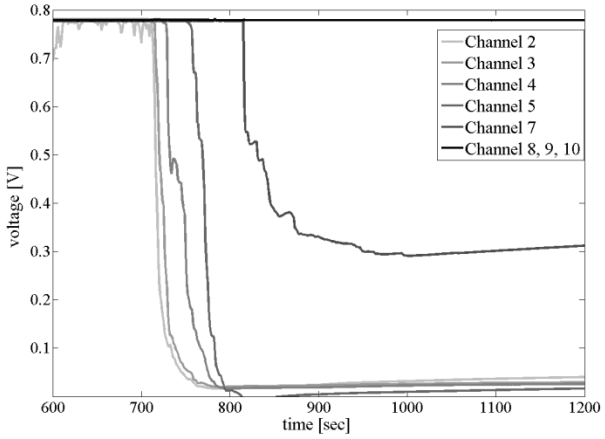

Figure 4: Sensor response to water percolating through the dike.

Outlook

Large-scale laboratory tests are projected in order to gain more information on the sensor feasibility and to develop sophisticated dike monitoring concepts. The planned model dike of 2 m height, 7 m width, and 2 m length is embedded in a concrete channel. This allows investigations on overflow events, wave overtopping, and percolation through the dike. As the model will consist of different soil layers, a more precise dike structure, which takes sealing, filter layers, and dike revetment into account, can be mapped.

In addition to laboratory testing, the developed dike sensors will be implemented in a real dike on a study site in Germany, which is purposed for early 2017.

Acknowledgements

The presented work is part of the project *EarlyDike*, founded by the German Federal Ministry of Education and Research (BMBF) (Project No. 03G0847A).

Changes of storm surges in the Bohai Sea derived from a numerical model simulation, 1961-2006

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ABSTRACT:

Using the tide-surge circulation model ADCIRC, the storm surges in the Bohai Sea were hindcasted from 1961 to 2006 after a regional model-based reconstruction of wind conditions. Through comparing with 4 storm surge cases that happened in the Bohai Sea and long-time observations at 4 tide gauges in the Yellow Sea, it is concluded that the model is capable of reproducing the conditions of storm surges in the past few decades in this area. The spatial distribution, seasonal variation, the interdecadal variability and the long-time trend were analyzed using the model results. Results show that the storm surges in three bays of the Bohai Sea are more serious than in other areas. The storm surges exhibit obvious seasonal variations - they are more serious in spring and autumn. Obvious interdecadal variations and long-time decreasing trends take place in the Bohai Sea. Storm surge indices show statistically significant negative correlations to the Arctic Oscillation (AO), and a statistically significant positive correlation to the Siberian High (SH). Linear-regression analysis was used to determine a robust link between the indices of the storm surges and the AO and SH. Using this link, conditions of storm surges from 1900 to 2006 were estimated from the long-time AO and SH.

KEYWORD: Storm surge Bohai Sea Hindcast Climate change

ENERGY DISSIPATION WITHIN THE WAVE RUN-UP AT STEPPED REVETMENTS

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Introduction

Besides an ever increasing demand to optimize a robust protection level against storm surges, coastal protection structures in urbanized coastal areas need to allow unobstructed access to coastal waterfronts and meet architectural landscape aspects. Both issues can be granted by a stepped revetment. Former studies and resulting design guidelines merely analysed the reduction of wave run-up and wave overtopping volumes over stepped revetments in physical model tests – most of them in regular waves and with a very limited variation of hydraulic and geometrical boundary conditions. Hence, these investigations led to design criteria with a limited range of application.

Stat of the Art

Recent literature and guidelines (e.g. KFKI (2007) or Van der Meer (1995)) give dimensionless design formulae (e.g. for run-up prediction on rough slopes) by

$$R_{u,2\%}/H_s = A\,\gamma_f\,\xi_{m\text{-}1,0} \qquad [1]$$

with $R_{u,2\%}$ depicting the run-up height exceeded by 2 % of the incoming waves, H_s the significant wave height, A as empirical contingent coefficient, γ_f as influence factor for roughness elements and $\xi_{m\text{-}1,0}$ as breaker parameter. The parameter γ_f takes values in the magnitude of 1.0 for grass, 0.95 for basalt or 0.6 for single layer rocks over an impermeable core (KFKI, 2007) while it is $0.56 < \gamma_f < 0.9$ for stepped revetments (Saville (1957), Wassing (1957), Jachowski (1964), Nussbaum & Colley (1971), McCartney (1976)). Saville (1957) started initially with run-up tests on composite slopes. Wassing (1957) summarized run-up tests conducted in the Netherlands for more than 20 years. Jachowski et al. (1964) and Nussbaum (1971) focused on the step geometry and its effect on the wave run-up. McCartney (1976) listed reduction coefficient in comparison to alternative revetments. It is known that for stepped revetments, γ_f decreases for milder slopes. A clear trend regarding the dependence of the wave height H_s in relation to the step height S_h cannot be drawn on the basis of the present available data sets since underlying processes during wave run-up and run-down have never been thoroughly addressed in any study.

Experimental Set-up and Test Conditions

To understand and describe the process of energy dissipation during the wave run-up over a stepped revetment a new set of physical model tests will be conducted. Selected flow conditions (i.e. varying flow velocities and layer thickness over each step) from the unsteady wave run-up (Figure 1) will be transferred to a steady flow set-up. This methodology allows a better understanding of underlying hydraulic processes. Flow resistance and integral energy dissipation will be linked to the full wave run-up process.

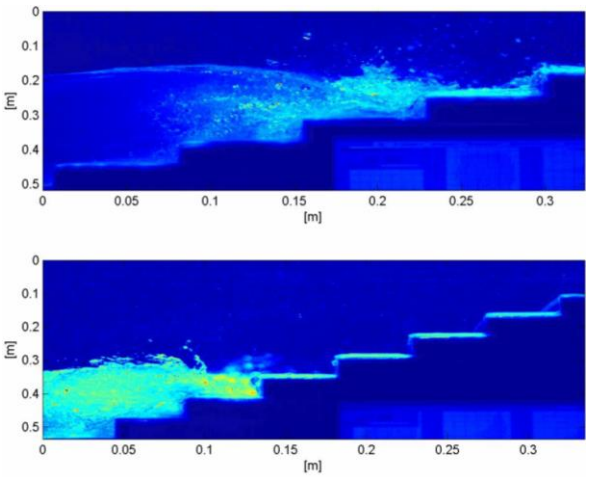

Figure 1: Interaction of a wave front in the beginning of the wave run-up process with a 1:3 (top) and 1:2 (bottom) inclined slope recorded with a high speed camera

Results

The study aims to close existing knowledge gaps of energy dissipation processes over stepped revetments and to allow a more reliable prediction of wave run-up performance of stepped revetments. A revision of existing literature regarding wave interaction with stepped revetments (Kerpen and Schlurmann, 2016) and previous tests on run-up and overtopping of regular waves on stepped revetments (Kerpen et al., 2014) showed a reduction of wave run-up heights and overtopping volumes in contrast to smooth slopes. Furthermore, an increasing roughness parameter γ_f decreases the run-up and overtopping values significantly.

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Experimental Study on the Dam-breakHydrodynamic Characteristics at the Gate Location

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ABSTRACT:

A dam-break flow usually means the propagation of a flood generated by a sudden dam collapse, causing catastrophic loss of lives, environments and economies downstream because of the large amount of water released instantaneously from the upstream reservoir. Although it is a fundamental fluid mechanics problem in building dams along the inland rivers, the research on dam-break waves also plays a crucial role in costal engineering. For example, when a tsunami wave propagates to the shore, the corresponding hydrodynamic characteristics including the variations of water levels and current velocities are rather similar to the dam-break flow. Therefore, detailed investigations on the propagation processes of dam-break waves can reveal the physical insight of tsunami bores, which contribute to predict tsunami propagation process and to assist disaster mitigation efforts.

Water level and current velocity are two fundamental parameters in studying dam-break waves. Ritter (1892) is the first to theoretically deduce the self-similar solution to the dam-break problem in an infinitely-long, horizontal, frictionless and prismatic rectangular channel with an initially dry bed at the downstream side of the dam. Dressler (1954) extended Ritter's solution to a rough bottom condition by including the hydraulic resistance term. Later, Stoker (1957) generalized Ritter’s solution for the wet bed condition to investigate the influence of the initial downstream water depth. Lin et al. (1980) presented hydrographs at the gate location of dam-break waves with a limited reservoir length under various cross-section shapes. However, few in-depth experimental validations of these analytical solutions exist owing to the difficulty in conducting the precise lab measurement and acquiring the qualified experimental data.

In laboratory experiments, the basic features of the dam-break waves at the gate should be verified primarily. In this study, several sets of experiments were performed in a rectangular and horizontal flume of 6.5m in length and 0.4m in width with different upstream reservoir lengths and different water head settings on the dry or wet downstream bed conditions. Specific comparisons of temporal water levels at the gate location obtained from the image analysis of the high-speed video camera recordings were conducted. Image-based water surface elevation was validated by comparing with the data measured using a wave gauge at 15cm downstream from the gate. Subsequently, temporal variation of the water surface elevation at the gate location was quantified in terms of high-speed video recorded images. Applicability of the aforementioned analytical solutions (after certain simplifications in equation derivation) to the real dam-break problem was validated. The full paper will present the detailed experimental setup and the corresponding results, including more comprehensive discussions.

KEYWORD: dam-break experiment, hydrodynamic characteristics, surface elevation, gate location.

Extended Wind Wave Model for Effect of Submerged Porous Media

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ABSTRACT:

Wave model simulation is one of the main sources for the practical marine and coastal engineering units to obtain the design wave conditions. The important physical mechanisms of waves are considered more complete, the simulation results of wave characteristics and distribution should be more realistic. In this paper, an extended phase-average wind wave model (WWM) is proposed to include the effect of submerged porous media (e.g. sand bottoms, porous reefs and structures) on wave energy dissipation. To enhance the model practical applications, the present thesis incorporates the dissipation coefficient for submerged porous media in the wave action equation (WAE). A basic formula of the dissipation coefficient with the turbulent flow resistance in porous media is obtained based on Lan et al. (2015), which the analysis mild-slope equation (MSE) proposed by Rojanankmthron et al. (1989) and imitated Isobe (1987) method to add the effect of submerged porous media in the WWM model. Rojankamthron et al. (1989) derived a modified MSE for describing no breaking waves traveling over a general submerged porous structures. The approximation is implemented into the WWM which has been coded with the finite element method (FEM) by Hsu et al. (2005). An iterative technique is applied to estimate the turbulent friction factor induced by porous media.

The accuracy of present model has been verified by comparing the experiments and numerical results for permeable bottoms and submerged breakwaters (see Fig. 1). The weighting factor in the estimation formula of proposed energy dissipation coefficient was recommended as 2.5 after the relevant verification. Reasonable comparisons with experiments and numerical results show the present model can be applied to waves propagation over porous beds and reefs. Several practical cases in Taiwan were investigated using the present model. Numerical result show that the wave decayed by the effect of porous bed in the west near shore (depths less 10 meters) of Taiwan. Wave scattering due to submerged porous structures is investigated in this paper. The effects of influence parameters for different geometries of submerged porous structures with various intrinsic permeabilities are discussed.

KEYWORD: Wind wave model; phase-average; submerged porous media; mild-slope equation; wave damping.

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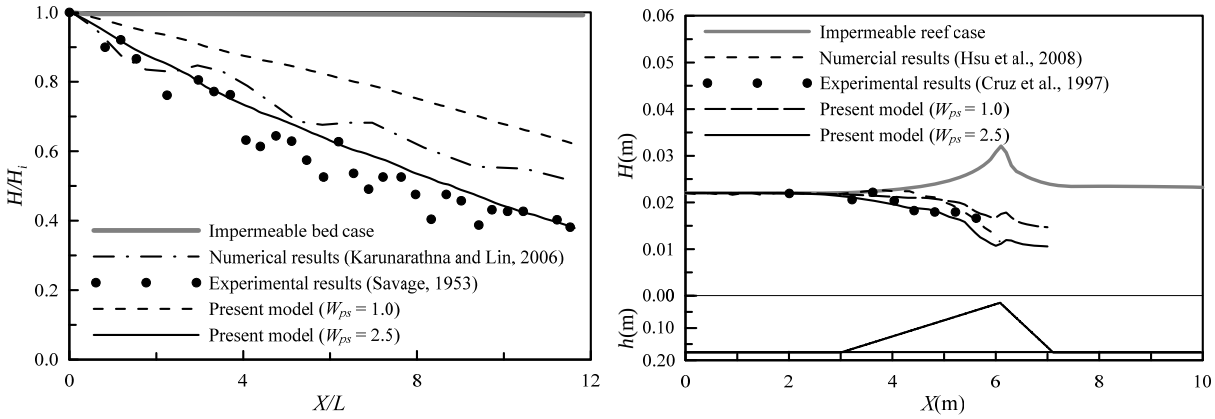

(a) a porous bed (Savage, 1953) (b) a triangular porous bar (Cruz et al., 1997)

Fig. 1 Comparisons of present WWM model results for wave damping along (a) a porous bed, (b) a triangular porous bar with the corresponding experimental results and numerical results.

Study on Sound Propagation in Shallow Water Environment

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ABSTRACT:
Sound is the most effective kind of wave which can propagate long distance in the seawater, it plays an important roles in accessing marine information. The characteristics of marine environment have a crucial effect on sound propagation. The relief of areas surrounding Chaoliandao is much smoother, natural inter-wave are observed there frequently. Acoustical experiment were completed near Chaoliandao, setting two stations named A and C, station A sending signals to station C, both the two stations can receive signals by hydrophones. Some marine environment parameters like temperature and depth can be measured by CTD at the same time, one aspect to note there is that the monitoring results must be adjusted with the tidal changes. According to the empirical formula, the sound speed profile between station A and station C can be obtained with the known quantity of temperature, salinity and depth. The normal theory and ray theory are popularly used in the study of coastal sound propagation. In this paper, the ray theory is applied to simulate the sound propagation because of the visually and effective results it delivered. The simulation results of ray including travel time, direction of arrival, and so on. Acoustic signal is converted into electrical signal by the hydrophones, which are lashed to the two experimental arrays. The hydrophones of station C receive the signal transmitted from station A. The arrival pattern recorded in C's hydrophones is result from the cross-correlation of the received signal with a replica of the emitted signal rather than the signal itself. Comparing the simulation results with the experimental results, we can get the conclusion that the acoustical experiment is valid. The arrival pattern can also be used to inverse the marine environment parameter, which is important for mankind to explore the ocean.

KEYWORD: Hydrophone, Acoustic Ray theory, Marine environment

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Flood defences considering the interaction of loads and engineering structures in urban regions

Dirk Carstensen, Jens Wilhelm

Topic: Hazards prevention

Key words: Flood defences, hydrodynamic-numerical models, sensitivity analyses, urban region

ABSTRACT

At present, there is an increasing risk of flooding worldwide. River flooding is the source which is most easily and commonly defended against in Germany.

Due to the latest scientific findings, reported by the Intergovernmental Panel on Climate Change (IPCC), it can be expected, that flooding in summers and winters as well as in transitional periods will become more intense. This depends e.g. on the geographical location and demonstrates even more clearly the negative impacts of climate change.

The flood defences in urban regions (e.g. City of Dresden and Nuremberg, as well as smaller towns and communities along the Elbe River), which will be described in the paper, are designed to offer protection to a large number of properties, usually as part of a wider flood defence strategy. Hydrodynamic-numerical models (e.g. far-field and near-field flow models) have been designed to compute velocity-, shear stress- and pressure distributions, and the resulting loads on bridges, hydraulic structures, embankments, flood defences, etc. .

Floods resulting from ice jam releasing events are particularly dangerous, because they often occur with little warning and are also associated with dramatic water level rises. The accumulation of ice on a stream, which produces extensive blockage of the river cross section (= definition of an ice jam), is initiated by natural or man-made obstacles in the stream (e.g. sand bars, bridge piers, levees etc.). A blockage may also be caused by a channel obstruction, which may consist of other ice floes or a change in channel alignment.

The paper will deal with the preparation and compilation of geo databases, the implementation of roughness parameters and hydraulic structures (groins, embankments, etc.), as well as the definition of boundary conditions in the before mentioned two-dimensional hydrodynamic- numerical models. Particularly emphasized will be further investigations in form of sensitivity analyses, as well as the planning and installation of temperature measuring systems at the Pegnitz River in the urban area of Nuremberg.

Furthermore, hydraulic modeling of the initial formation of ice arching of non-uniform fragmented ice floes at the upstream faces of bridge piers will be examined.

The simulations and experiments, reported about in the presentation, were primarily designed to determine the effects of several parameters – water level, water surface slope, velocity distribution, clearance between bridge piers, loads influenced by the flow velocity, etc. – on the design of flood defences depending on the design discharge. There are various flood defences available for urban regions, which can be described as either hard or soft. The presentation will also include information reflecting these findings.

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Storm Surge Case Studies

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ABSTRACT:
This presentation details on a number storms surge cases: along the Southern Baltic sea coast, the estuary of the Elbe in Germany and the East China Sea coast at Qingdao. These case studies feature storm surge characteristics, specifically, losses of life and property, erosion extent, and relationship to extra-tropical and tropical storm intensity. These cases demonstrate the severity of the issue and the need of precautionary measures, not only for limiting the possible damages, but also for being able to manage for a possible failure of the coastal defense measures.

OPERATIONAL WAVE NOW- AND FORECAST IN THE GERMAN BIGHT AS A BASIS FOR THE ASSESSMENT OF WAVE-INDUCED HYDRODYNAMIC LOADS ON COASTAL DIKES

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Session: Coastal engineering & Hazards prevention

Keywords: German North Sea coast, Cosmo-DE, Cosmo-EU, SWAN, local waves, wave run-up

INTRODUCTION

The hydrodynamic design conditions as e.g. dynamic high-pressure impacts or high-flow-velocities, high turbulent currents on coastal dikes are a direct result of the local wave conditions in coastal areas. High water levels alone, which may occur even over comparatively long periods, do normally not cause any direct damage on coastal dikes. Extreme high flow velocities that may also cause erosion on Coastal Dikes are at least at the German North Sea Coast normally not induced by local tides or other large-scale currents. Therefore, the knowledge of the wave-induced hydrodynamic loads on coastal dikes including their temporal and spatial resolution on the dike in combination with actual water levels is of crucial importance of any risk-based early warning system.

METHOD

The general methodological approach is to describe and forecast hydrodynamic loads on the dike based on a system of field data measured as standard within existing measurement chains by DWD, BSH, local authorities, etc. and field data from a local measurement chain installed at the North Frisian Island of Pellworm in combination with a set of data from a combination of numerical models and physical / empirical approaches which are site specifically implemented and developed (Figure 1).

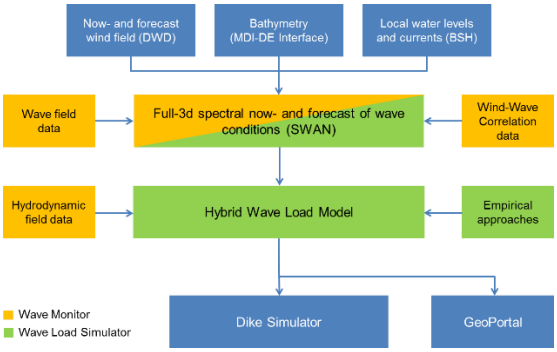

Figure 1. Methodological set-up and data flow for wave now- and forecast and wave load model

MODEL SET-UP (SWAN)

The operational wave now- and forecast model, which will be implemented as the basis for the Wave Monitor and the Wave Load Simulator (cf. Figure 1), is based on the spectral third generation wave model SWAN (TU Delft) and will provide the overall phase-averaged wave conditions from the North Sea over the Wadden Sea Areas up to the assessment site. Input data for the wave model are: (i) available “historical”, actual (derived from the pressure field) and forecasted hourly local wind fields from the German Weather Service (DWD) from the COSMO-EU and COSMO-DE models and their forerunner models, respectively (ii) available long-term wave and wind measurement data for the North Sea from selected wave stations (e.g. FINO research platforms, Westerland and Helgoland) and as well as long-term simulated wave data and wind fields over the North Sea (e.g. HYPOCAS-data and coastDat-data from the CERA – database covering a period of approx. 65 years) (iii) local water-level data in combination with flow-velocity- and flow-direction-data from the forecast models of BSH (German Federal Maritime and Hydrographic Agency) (iv) freely available bathymetric data in combination with survey data from BSH, the responsible WSÄ (German Waterways and Shipping Offices), Coastal Protection Authorities, namely NLWKN (NDS) and LKN (S-H) and from the MDI-DE (Marine Dateninfrastruktur Deutschland) and from the BMBF-AufMod project which are also freely available.

Based on the local phase-averaged wave information and in combination with local wave measurements, a phase-resolved wave load model (the Hybrid Wave Load Model, cf. Figure 1) is operated with the main goal to assess the wave-induced loads onto the dike wave-by-wave.

OUTLOOK

In the paper, we will give more information about the set-up and performance of the operational wave model such as the horizontal and temporal resolution of the model and the integration of the local water levels and currents. In addition, the now- and forecast quality (accuracy) and uncertainties of the operational wave model are assessed based on hindcasts of the wave conditions using the already available wind input data (COSMO-EU / COSMO-DE) and data from available wave measurements in the North Sea performed by LKN-SH, BSH, etc., where sudden changes and anomalies in the data as well as extreme wave conditions and extreme high water levels are especially being taken into account. Moreover, the local measurement chain for the assessment of the wave-induced hydrodynamic loads on the dike and the phase-resolved modelling

approach as the basis for the integrated data-driven hybrid wave load model will be described.

ACKNOWLEDGEMENTS

The work described in this contribution is performed within the joint research project Early Dike (Sensor and Risk based Early Warning System for Coastal Dikes). The project is founded by the German Ministry of Education and Research (BMBF, grant nr. 03G0847C).

APPLIED THE BACK-PROPAGATION NEURAL NETWORK TO PREDICT SEA-LEVEL CHANGES

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ABSTRACT:

In 2015 The UN Framework on Climate Change (UNFCCC) at the 21th of the annual Conference of Parties (COP21), also known as the 2015 Paris Climate Conference, for the first time in over 20 years of UN negotiations, aim to achieve a legally binding and universal agreement on climate, with the aim of keeping global warming below 2°C. The ability to keep temperatures below 2°C will avoid that extreme weather will induced the increase the vulnerability of disaster, such as sea levels rise.

As an island, Taiwan is especially sensitive to the impact of the global climate change. Taiwan's sea level has risen by an average of 3 centimeters over the past 10 years. Coastal floods will be more and more frequent over Taiwan areas in the further. Therefore, we are going to face an issue of sustainable development in our coastal areas. In this study, we will aim to develop the different innovative algorithms, such as the Fourier transform, the back-propagation neural network (BPN) and the ensemble empirical mode decomposition, to evaluate the long term sea level change around Taiwan and East Asia coastal waters based on the observed tidal gauge data.

The original data of the Jiangjiun Harbor station at Taiwan from 1954 to 2014 will be used to test the performance of the present model. The results indicate that the long term sea-level rise in 2030. Moreover, comparing other method predicted the long term sea-level, it was found that the BPN have a good ability of prediction.

KEYWORDS: Climate change; back-propagation neural network, sea-level change

An analytical model for typhoon wind field based on logarithmic spiral trajectory

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ABSTRACT:
In the areas affected by typhoons, an effective approach to the risk assessment of a typhoon disaster is to simulate the typhoon wind field using limited information, such as the typhoon's position, central pressure drop and radius to maximum winds. The reliability of the wind field model used to calculate the surface wind speed plays a vital role.

In this study, a new analytical model is developed to simulate the surface wind speed distribution of a typhoon. Following the discussion of previous researches, the spiral flows have obvious influence to the wind field distribution of a typhoon. Hence, the logarithmic spiral was used to depict the spiral flow of a typhoon and some conclusions based on this assumption were acquired. Firstly, a Lagrange coordinate system was established at the center of a typhoon and moving with it. Then an assumption of planar logarithmic spiral trajectories for typhoon particles is proposed without considering vertical motion. The radial wind speed distribution can be acquired from the analysis of the normal equilibrium equation. Through comparisons of wind speed distribution with the previous studies, the assumption of logarithmic spiral trajectory was proved to be suitable for a symmetric stationary typhoon. Detailed comparisons and evaluations of typhoon model based on the logarithmic spiral trajectories(LST model) with the parametric typhoon model using the gradient wind equation (GT model) are performed, and the results indicated that the LST model can be simplified into the GT model with the relative error of the wind speed less than 8%. As the direction of the frictional drag parallel to the wind velocity, the frictional drag can be neglected in the normal equation of the LST model, and under the same assumption, this conclusion can be extended to explain that the frictional drag can be neglected in the GT model.
By solving the tangential and normal equilibrium equations along the particles' spiral trajectories, the Holland β parameter was derived from the LST model. In the literatures about the risk assessment of a typhoon disaster, the maximum surface wind speed is especially emphasized. So a slab surface layer is used to analyze the surface pressure and the surface wind field distributions in a typhoon, and the frictional drag at the upper and lower boundaries (i.e., the sea surface) of the surface layer is evaluated. Based on the analysis of the tangential equilibrium equation, the formula for calculating Holland β parameter was derived. Calculation results demonstrated that the factors influencing the Holland β parameter included the surface layer depth, the latitude and the radius to maximum winds. At the same pressure drop, the β parameter decreases as the surface layer depth decreasing, as shown in Fig.1.A markedly negative correlation between β and the latitude could be seen in Fig.2 when the surface layer depth is set constant. It also could be seen that the β parameter was decreased as the increasing radius to maximum winds, as shown in Fig.3.

The models are applied to the 17th typhoon NESAT and the19th typhoon NALGAE of 2011, through comparisons between the simulated and observed wind records, the LST model proposed in this study exhibit very good agreement in the simulation of the wind speeds and directions.

KEYWORD: Spiral trajectory; Holland β parameter; Typhoon; Wind field model; LST model

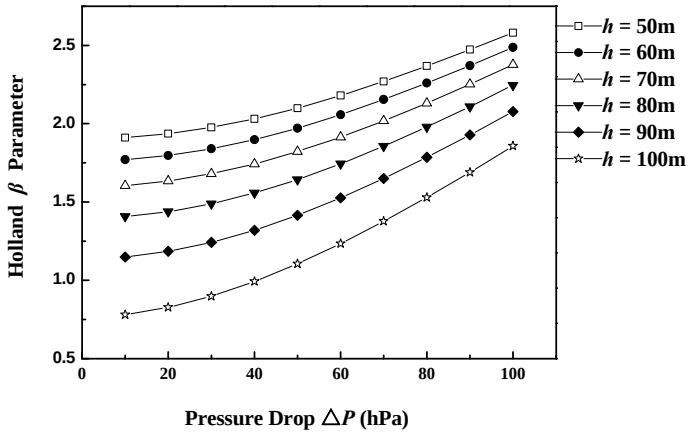

Fig.1. Relationship between the Holland β parameter and the central pressure drop ΔP, which varies with the surface layer depth h

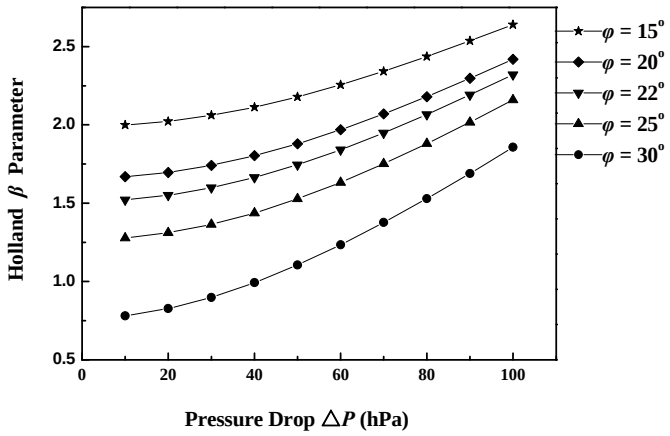

Fig.2. Relationship between the Holland β parameter and the central pressure drop ΔP, which varies with the latitude φ

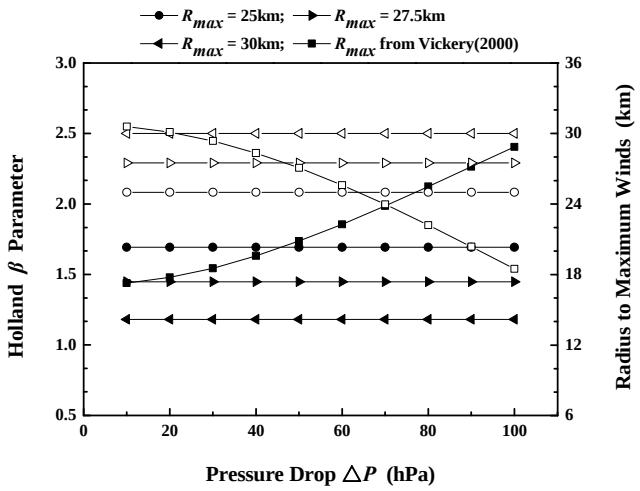

Fig.3. Relationship between the Holland β parameter and the central pressure drop ΔP, which varies with the radius to maximum winds R_{max}: the solid symbols represent β and the hollow symbols represent R_{max}

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A nonlinear Schrödinger equation for gravity waves with linear shear currents in infinite water

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ABSTRACT:
Wave-current interaction is a key issue in ocean and coastal engineering, the presence of currents can significant influence the characteristics of ocean waves. The theories of this issue were mainly established assuming that currents are uniform in water depth. This assumption is applicable in most cases, but in some circumstances, such as wind-driven currents, the rotation of currents cannot be ignored.

The problem of water waves propagating on a sheared current has been studied by many researchers. Using the multiple scale method, several nonlinear Schrödinger equations with constant vorticity (VNLS) were derived (Li et al., 1987, Baumstein, 1998 and Thomas et al., 2012). Then, the effect of constant vorticity on the modulational instability of wave trains were analyzed using these VNLS equations. However, these equations only considered the effect of vorticity, the combination influence of currents and vorticities was ignored.

In the present study, assuming that the variation of water waves is slow, a nonlinear Schrödinger equation for water waves on linear sheared currents is derived using the multiple scale method:

$$A_t + c_g A_x + i\alpha A_{xx} + i\beta |A|^2 A = 0, \tag{1}$$

with

$$\alpha = \frac{\omega}{k^2}\left[\frac{(1+\bar{\Omega}-\bar{u}^2)^2}{(2+\bar{\Omega}-2\bar{u})^3} + \frac{\bar{u}(2\bar{u}-2-2\bar{\Omega}+\bar{u}\bar{\Omega})}{(2+\bar{\Omega}-2\bar{u})^2}\right], \qquad \beta = \frac{\omega k^2(1+\bar{\Omega}-\bar{u})(M+VW)}{8(1-\bar{u})^2(2+\bar{\Omega}-2\bar{u})},$$

$$\begin{aligned} M = {} & 8+24\bar{\Omega}+34\bar{\Omega}^2+26\bar{\Omega}^3+9\bar{\Omega}^4+\bar{\Omega}^5-(40+96\bar{\Omega}+102\bar{\Omega}^2+52\bar{\Omega}^3+9\bar{\Omega}^4)\bar{u} \\ & +2(40+72\bar{\Omega}+51\bar{\Omega}^2+13\bar{\Omega}^3)\bar{u}^2-8\bar{u}^5-2(40+48\bar{\Omega}+17\bar{\Omega}^2)\bar{u}^3+40(1+6\bar{\Omega})\bar{u}^4, \end{aligned}$$

$$VW = \frac{-\bar{\Omega}^2(2+\bar{\Omega}-2\bar{u})^3(1-\bar{u})^2(1+\bar{\Omega}-\bar{u})}{1+\bar{\Omega}-\bar{u}[\bar{u}^2+(1-\bar{u})(3+\bar{\Omega})]}, \qquad c_g = \frac{(1+\bar{\Omega}-\bar{u}^2)\omega}{(2+\bar{\Omega}-2\bar{u})k},$$

where A is the complex amplitude of the first harmonic of the Stokes waves, which is slowly varying on a time scale t and a space scale x; ω is the intrinsic angular frequency, k is the wave number; $\bar{u} = U/c_0$, $\bar{\Omega} = \Omega / \omega$, U is the surface current velocity, Ω is the vorticity, c_0 is the velocity of the carrier wave in the absence of currents and c_g is the group velocity in the presence of the current.

Figure 1 shows the changes of wave amplitudes on uniform currents. It is shown that the results predicted by the present equation fit well with the classic linear and nonlinear results. The influence of nonlinearity is negligible, especially on following currents.

The influences of currents and vorticities on the changes of wave length are shown in Figures 2 and 3. For uniform currents, the wave length calculated by the nonlinear wave theory is larger than that of the linear theory on both following and opposing currents. Furthermore, it is found that negative vorticities can stretch wave length and the extent increases with increasing vorticity. However, following currents with positive vorticities have the contrary effect.

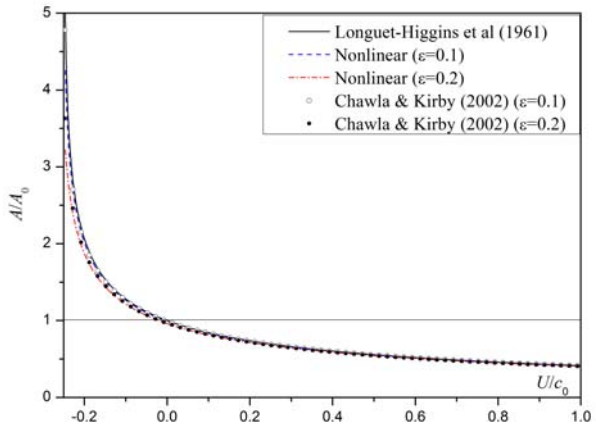

Figure 1. Variations of wave amplitudes with uniform currents (A_0 is the amplitude without currents).

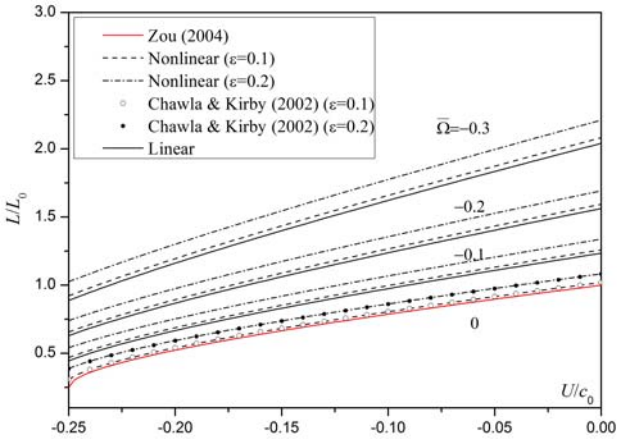

Figure 2. Variations of wave length on sheared opposing currents.

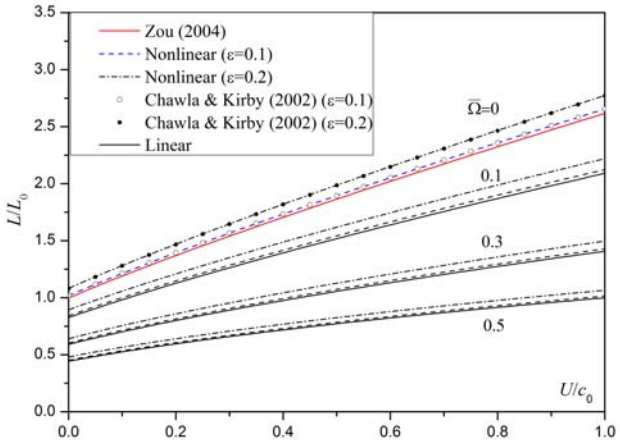

Figure 3. Variations of wave length on sheared following currents.

A revisit to the wave boundary layer streaming phenomenon - the Eulerian velocity in Longuet-Higgins (1957)

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ABSTRACT:

Correct estimation of the cross-shore sediment transport rate in the nearshore area is of great importance to accurately understand the coastal morphodynamic process. Considering that the bottom wave boundary layer plays a significant role in studying the coastal sediment movement, a detailed investigation of the corresponding parameters, such as velocity distribution inside the boundary layer, is needed. The difference of the net sand transport rate between the oscillating water tunnel (OWT) and the large wave flume experiments (LWF) has attracted researchers' attention (Dohmen-Janssen and Hans, 2002). In general, the LWF experiment presented a larger onshore net transport rate than that of the OWT experiment under the same horizontal velocity conditions. Some researchers attributed this to (or partially to) the onshore boundary streaming phenomenon, which is an Eulerian velocity first proposed by Longuet-Higgins (LH, 1957). In LWF experiment, a vertical velocity occurs in the bottom boundary which does not exist in the OWT experiment. Because part of this vertical velocity is in phase with the horizontal velocity and considering the force balance between the viscous stress and the Reynolds stress inside the boundary water body, LH demonstrated the derivation procedure for obtaining the nonlinear (second-order) mean (time-averaged) velocity inside the sinusoidal laminar wave boundary layer. However, the equation of this boundary layer streaming in LH (1957) is implicit. Later, Watanabe (1979) and Nielsen (1992) provided the explicit formula of this velocity respectively, but with different expressions (although tiny). To our knowledge, there is no other explicit expressions of this boundary streaming velocity till now. In this study, we revisited the derivation procedure in LH (1957) and re-derived the explicit expression of this Eulerian velocity distribution in the boundary layer. Then, the streaming characteristics were further investigated in terms of the newly derived formula. Besides, on the basis of LH(1953, 1957), the second-order mass transport velocity (Stokes drift, the Lagrangian velocity) was also studied, presenting its expression both in the bottom boundary layer and the entire water body. Subsequently, the above two nonlinear velocities (the Eulerian and Lagrangian velocities), together with their physical insights, were further compared and discussed inside the boundary layer, which assisted us to concrete the in-depth knowledge of the boundary layer streaming phenomenon, and to reveal its influence on the cross-shore sediment transport in the coastal zone.

KEYWORD: Boundary streaming, Eulerian velocity, Lagrangian velocitiy

Numerical Simulation of Typhoon Induced Storm Surge along Jiangsu Coasts, China

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ABSTRACT:

Jiangsu coastal area is located at the central eastern China and is well known as the complicated dynamics with a large scale radial sand ridges system as shown in Fig.1. It is therefore still a challenge to simulate the typhoon induced storm surge in this area, although it is the main kind of coastal disaster and is attracting more and more attentions from government and researchers. In this paper, the natural situation of Jiangsu coasts and the characteristics of the storm surge are analysed. Then a 2-D astronomical tide and storm surge coupling model is established to simulate three typical kinds of typhoon in this area, in which Holland parameter model is used to add the background wind field and the offshore boundary information is provided by the improved Northwest Pacific Ocean Tide Model. The maximum storm surge along the Jiangsu coasts are calculated on the basis of the analysis of wind data from 1949 to 2013 and the satisfactory numerical validations, which provide the reference for the design of sea dike and the resilience of coastal disaster.

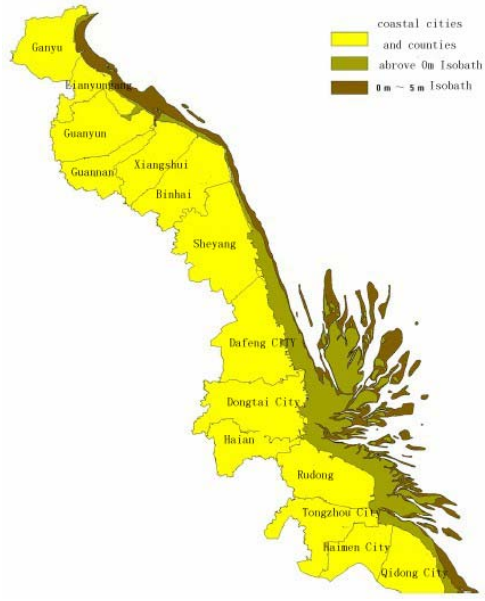

Figure 1. Jiangsu coasts with radial sand ridges system

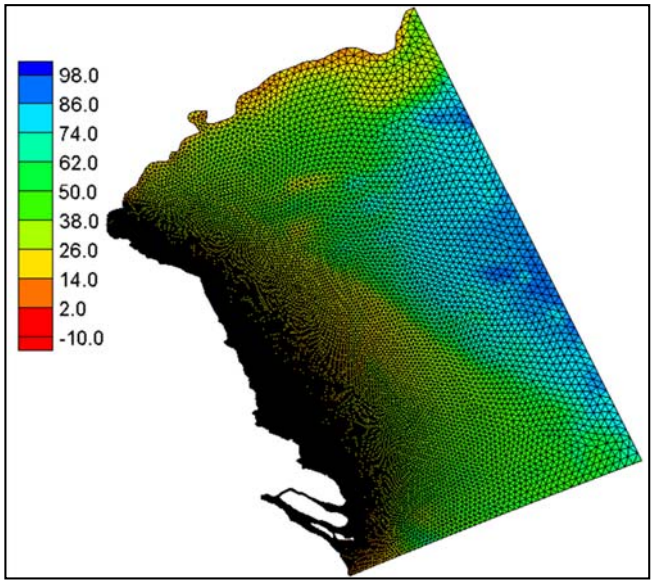

Figure 2. Domain and grids of numerical model

Abstract for poster sessions on the 8. Chinese-German Joint Symposium on Hydraulic and Ocean Eng.

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Keywords: Sediment transport, SPM, cohesive sediments, estuarine turbidity maximum (ETM), net-deposition, navigation channel, hydrodynamic numerical model, Delft3D, Fluff-Layer-Concept

Modelling estuarine cohesive sediment dynamics and net-deposition at the ETM

In the navigation channel of Weser Estuary (northern Germany) net-deposition of predominantly cohesive sediments leads to a high maintenance afford to guarantee save shipping traffic to adjacent ports. The core area for dredging of the inner part of the estuary coincidences with the typical location of the estuarine turbidity maximum (ETM). Field studies give evidence that fluid mud formation is present there as well.

To analyses the processes which lead to this net-deposition and get a better understanding of the behavior of the cohesive sediments in the estuarine environment a 3D hydrodynamic numerical model (Delft3D by Deltares) of the Weser Estuary was set up. The focus lies on the correct reproduction of (cohesive) sediment dynamics (compared to measured turbidity), sediment transport from the boundaries into the estuary, the formation of the ETM (due to the salinity gradient and tide induced processes) and eventually the development of net-deposition areas in the navigation channel. Non-cohesive sediment fractions (e.g. sands) are deliberately excluded. Furthermore, no initial bed sediments are defined to show that the ETM formation is achieved by actual accumulation of sediments in the brackish zone (sediment transport limitation) and not only by local erosion (erosion limitation). Two open boundaries (sea and river weir) with appropriate boundary conditions (tidal forcing by water level and river discharge respectively as well as salinity and sediment concentrations) are defined. A relative resolution of 10 Layers with reference to water surface is applied to discretize processes in the water column. At the bed two layers are defined for the sediment exchange. Special features of the model are different model approaches for cohesive and non-cohesive sediments. The settling velocity, for example, is not a function of the particle size (Stokes law) as this constant dependency is not valid in general for cohesive sediments due to processes like flocculation. Another feature is the application of the Fluff-Layer-Concept (developed by Deltares). This provides the possibility to simulate an additional, artificial, spatial dimensionless, exchange layer with erosion properties that can differ from the general erosion properties of the actual bed layer where the well-known Partheniades-Krone formulation is used.

With this concept it is possible to take the effect of processes into account which are not implemented in the model in detail (e.g. consolidation, fluid mud). Thus, this enables the simulation of high tidal SPM-dynamics and appropriate transport from the model boundaries (relative high potential erosion of fluff layer) as well as long-term net-deposition (relative low potential erosion of bed layer) in areas with temporally high near bed sediment concentrations e.g. within the reach of the ETM.

The poster will be divided in two parts: 1) A flow chart describing the key parameters and processes of the model with selected terms of the sediment transport and bed exchange formulation. 2) Model results: E.g. cumulated sediment transport at cross sections, averaged salinity and sediment concentration in length sections to show the ETM development and maps of net-deposition areas.

Sea Level Rise and Its Impact on Beach Erosion in Tainan Coast

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ABSTRACT:
Taiwan now faces a serious threat of sea level rise and coastal erosion. Predict future shoreline position and draw an erosion potential map is an indispensable work for formulate a coastal protection plan and implement an integrated coastal management. In this paper, we using maps, air photos and satellite images to analyze the historical shoreline change in southern Tainan city, also we adopted an enhanced Bruun rule to compute shoreline retreat under sea level rise. Jinchen, Yuguang, Kunshen and Xipaei, more than 70% of the shoreline belongs to stable and advance status. But Xinan shoreline has retreat with a rate about -6.6 m/year in recent 10 years and about 32.9% of its shoreline is standing on high retreat status. Under the threat of sea level rise, this village also has the maximum shoreline retreat; its shoreline will be receding about 20.9m, i.e., the most vulnerable coast is Xinan village.

Research on the Effect of Roots on Slope Stability under Seepage

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ABSTRACT:

The seepage caused by water level change is one of the important factors that cause slope instability. In order to prevent instability, based on the principle of environmental protection, vegetation planting is applied to revetment engineering. Through triaxial seepage shear tests of grassroots-reinforced soil, roots' function of reducing seepage damage on soil strength is analyzed. The laboratory test results show that the effect of roots on resisting seepage damage is limited to a certain depth range, and then a calculation formula for the depth is derived. Moreover, since the action depth of roots is shallow, roots' function on maintaining slope stability can't be effectively reflected by the whole slope stability analysis. Therefore the sum of deformation energy in roots area is proposed as the index of judging roots' role in revetment engineering. And on this basis ABAQUS software package is employed to simulate slope under seepage. By comparing the deformation energies in roots area before and after planting vegetation, the role of roots in inhibiting the deformation of shallow slope is figured out.

KEYWORD: revetment engineering; seepage; triaxial test; deformation energy; slope stability

Marine energy

Simulation on the Coastal Freak Wave Occurrence using SPH Approach

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Abstract

Fishing men or visitors frequently suffered drowning accidents by sweeping into the water from coastal freak waves over the past decade in northeastern Taiwan, especially in Keelung city. According to the precious study, the typhoon swell with higher wave heights and long wave periods attacking on the coastal structures during typhoon periods could be a major cause for those hazard events. Therefore, understanding the hydrodynamic behaviors between the waves and coastal structures are the key points for the further preventions. In order to accurately predict the extremely large deformation of free surface while the wave attacking the coastal structures, the Smoothed Particle Hydrodynamics (SPH) model with a nonlinear and mesh-free numerical tool has been adopted in this paper.

To consider larger wave in northeastern Taiwan, the incident wave conditions from the measured data have been applied. With over 10,000 fluid particles and about 400 particles for breakwater, the simulated wave conditions with wave heights of 4.5 m and wave periods of 15 s for typhoon waves and wave heights of 1.5 m and wave periods of 8 s for non-typhoon periods show that the overtopping discharges pounding on the crown walls for typhoon waves are much larger than that for the non-typhoon periods. Comparisons of the overtopping throw speeds above the crest wall and the overtopping flow rear the breakwaters shall in more details be discussed in the full paper.

Lateral behavior of the pile under wave-pile-soil interactions in sand

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ABSTRACT:

In the recent decades, the pressing need for clean and sustainable sources of energy grows rapidly. In order to meet that demand, the harvest of wind energy through the use of large wind turbines is likely to play a key role, and many offshore wind farms are planned to be built (Matthies et al., 1995). Due to the relative lower costs of production, storage and installation, monopile is one of the mostly-used types of the foundation for offshore wind turbine while another main type is multi-pile. However, challenges and problems posing by these turbine foundations still exist. The effects on the foundation due to permanent exposure to cyclic loading from offshore environment (e.g. wind and waves) are still not well/fully understood (Randolph et al., 2005; Rücker, 2007). Among these effects, the general trend of pile response to the action of waves (Peng, 2011) and the influence of the action of waves on the lateral bearing capacity of pile (Rajashree & Sundaravadivelu, 1996) attract most attention. Especially when the soil liquefaction happens under wave forces (B. Liu et al, 2015; Cuéllar et al, 2012) and leading to the degeneration of lateral bearing capacity.

The experiments were carried out in a wave tank. The tank is 1 meter by width and 1.2 meters by depth which can be used to simulate regular waves with various wave parameter. According to the similarity criterion, the scale of the model is set up as 1:100, and the parameters of waves are listed in Table 1. The modeling piles with a wall thickness of 2mm are made from organic glass and the diameters are 5 cm and 3 cm respectively. Strain gauges (SG) are uniformly positioned in various levels of the pile in symmetry (Fig.1). Laser displacement censor is put at the near-top of the pile to measure the movement of the pile top. In order to obtain enough embedded depth of model pile, a 35cm deep groove is dug, and two side blocks of 25cm height which expands horizontally and then a slope gradient 1:10 are located. Finally, the sand depth can reach 60cm with d_{50} (d_{50} is the grain size at which 50% of the soil is finer) equals 0.06mm in diameter. Pore-pressure Transducers (PPTs) are put in different levels of the sand to measure the change of pore water pressure. To measure the change of lateral bearing capacity of pile, fixed pulleys are used to apply horizontal loading before and after the action of waves. The details of setting up are shown in Fig. 1.

The experimental results can well demonstrate the lateral behavior of pile under wave action. Based on the measurement of strain, the distribution of bending moment of pile, wave force and earth resistance are gained. The pore water pressure fluctuates and accumulates. Consequently, the resistant ability of soil lessens while the pore water pressure increases. However, after certain times of circulation, the pile-soil stiffness stay steady. Furthermore, the lateral bearing capacity of pile decreases due to the circulation of wave forces.

Table 1 Parameters of model Pile and Wave

Parameters		Prototype scale	Model scale
Pile	Diameter	5m/3m	0.05m/0.03m

	Embedded Depth	30m	0.3m
Wave	Height	10~12m	0.10m~0.12m
	Depth	30m	0.3m
	Period time	10s	1.0s

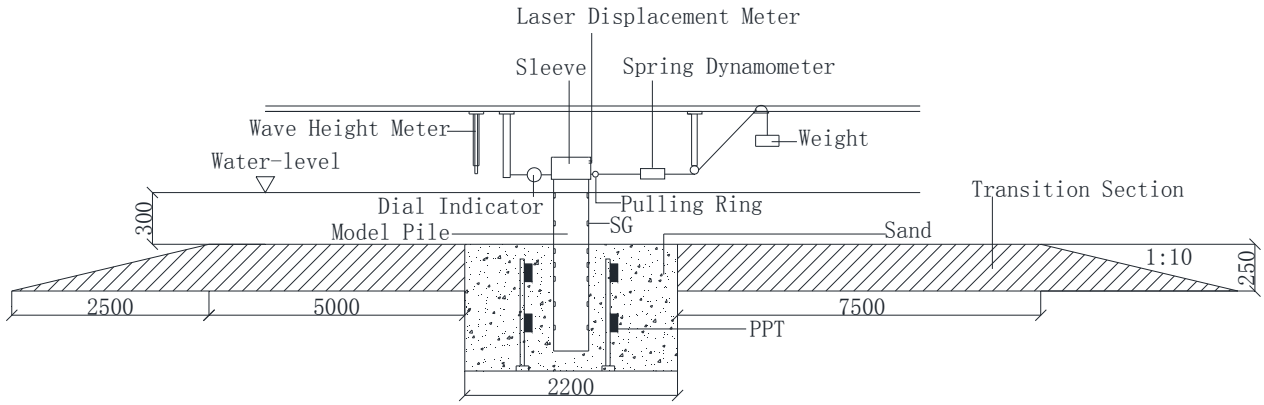

Fig 1. Layout of the experiments (mm)

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Geometrical damping of offshore monopoles under dynamic horizontal forces

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ABSTRACT:
With the development of offshore wind energy, more and more offshore wind turbines are being constructed worldwide. Among the constructed offshore wind turbines, a large part of them are supported on monopiles. As tall and slender offshore wind turbines are very sensitivity to the dynamic loadings at low frequencies, if designed improperly, it is likely to cause resonances. On the other hand, most of the designs ignore the geometrical damping of offshore monopile foundations, which will lead to a conservative solution and a cost of much more money. In this paper, by modeling saturated soil as a Biot poroelastic medium, and monopole as rigid shell, we obtain the corresponding horizontal and rocking geometrical damping ratios for offshore monopiles at low frequencies. With these damping ratios obtained, one can develop a more realistic and economic model to calculate the dynamic responses of offshore wind turbines supported on monopiles under both dynamic horizontal forces and moments at low frequencies.

KEYWORD: geometrical damping, offshore wind turbines, monopiles, horizontal forces.

Study on the Energy Conversion Efficiency Enhancement of a Fixed Point Absorption Wave Converter

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ABSTRACT:

The energy conversion efficiency of a fixed point absorption wave converter (FPAWC) was improved mechanically with a gearbox and an overdrive gear set. Hydraulic model experiments were carried out to evaluate the efficiency. The FPAWC was designed to be low-cost, easy-care, and highly efficient in converting wave energy for low wave height conditions. This is especially suitable for the summer wave conditions in Taiwan. The FPAWC is mainly composed of a moving buoy, a set of mechanical linkage devices, including gears, rods, connectors, etc., and a power generator. The buoy captures wave energy through its vertical heave movement. The set of mechanical linkage devices transfers the captured energy to the power generator. Finally, the electricity is generated through the spinning rotor moved by the set of mechanical linkage devices.

The set of mechanical linkage devices was improved mechanically with a gearbox and an overdrive gear set comparing to the previous one. The gearbox is to amplify the torque generated by the buoy and to keep the rotor spinning unidirectionally. The overdrive gear set is to increase and maintain the suitable RPM (Revolutions Per Minute) of the rotor to generate electricity. A 1/10 scale physical hydraulic model of the FPAWC was built to test the energy conversion efficiency. The model was tested in a flume with the dimension of 3 m × 3 m × 100 m. Both regular and irregular wave conditions were applied to investigate the RAO (Rate of Amplitude Operation) of the buoy and the RPM of the rotor for the best energy conversion efficiency.

For the configuration of the experiments, the water depth of the flume was set to be 1.3 m; the wave height was chosen to be 20 cm and 25 cm, and the period was chosen from 1.2 sec to 3.2 sec for every 0.2 sec for the regular wave condition; the significant wave height was chosen to be 20 cm, and the significant period was chosen from 1.2 sec to 3.2 sec for every 0.2 sec for the irregular wave condition based on the JONSWAP spectrum with gamma value of 3.3.

From the results of the experiments, the best power efficiency of the model is more than 40%, the average power generation is more than 30 W, and the RAO is more than 0.7 for the regular wave conditions of wave height at 25 cm and periods in the range of 1.6–2.2 sec. For the irregular wave conditions of periods in the range of 1.6–2.2 sec, the maximum average power generation of the model is more than 11 W and the RAO is more than 0.6. The experiment results show that the overall power efficiency is improved more than 20% comparing to the previous model and the total energy conversion of a full-scale model can be more than 70%.

KEYWORD:renewable energy, wave energy, hydraulic experiment, wave converter

Study on the Use of Porous Structures in Heave-type WEC

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ABSTRACT:

For the traditional heave-type **WEC** (Wave Energy Converter), the effective bandwidth for capturing energy is relatively narrow. Broadening the bandwidth is of great significance for the engineering application in wave energy industry. In this paper, a new structural style of the heave-type **WEC** is proposed and it can be regarded as a truncated cylinder with upper sidewall and an inner column geometrically (see Fig. 1). An analytical study based on linear potential theory is conducted to investigate the hydrodynamic performance of the proposed device. The results show that the effective bandwidth is broadened obviously, the surge wave excitation force and heave RAO in operational conditions are also reduced significantly, which may be beneficial to the safety of the device.

Using multi-decadal met-ocean hindcasts and scenarios for assessing marine renewable energy potential

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ABSTRACT:
The potential for marine renewable energies can be derived from different sources comprising wave energy, energy from tidal range or currents, ocean currents, ocean thermal energy conversion or salinity gradients. While not strictly marine, energy from offshore wind resources maybe considered in addition. Technologies to use energy from the various sources are at different levels of development but are, apart from offshore wind, mostly at early stages. Similarly, assessments of the theoretically harvestable power, its variability and potential change over the life time of an installation together with assessments of site specific environmental conditions is often preliminary and based on limited met-ocean data. Here we show how existing consistent met-ocean hindcasts and scenarios may enhance the situation. Based on existing high-resolution multi-decadal simulations for the North Sea some examples for an assessment of the existing resources will be presented. Starting from relative simple cases such as the long-term mean of wave energy flow, its seasonal or inter-annual variability and change more advanced cases will be developed. The latter comprises for examples studies on potential synergies between different renewable energy resources or studies on the interplay with conventional resources taking weather variability and legislation into account.

Experimental Study of Salinity Gradient Energy on Module Scale

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ABSTRACT:
This paper analyzes the structural feature of a press-retarded osmosis (PRO) membrane module via an experimental approach and presents the relationship between the water flux and operating conditions for design and operation of a large-scale PRO process. The PRO module has four ports: an inlet/outlet for the draw solution and an inlet/outlet for feed solution. In this work, we use a new method to characterize membranes under a variety of pressure and concentration, including hydraulic pressure up to 13 bar and concentrations of up to 2M NaCl. We find water permeate flow increase and membrane selectivity decrease as the draw solution concentration is increased, and power density is constrained by the trade-off between permeability and selectivity of the membrane active layer. This behavior is attributed to the opposing influence of the beneficial effect of membrane water permeability and the detrimental impact of reverse salt flux coupled with internal concentration polarization. Our analysis reveals the intricate influence of active and support layer properties on power density and demonstrate that membrane performance is maximized by tailoring the water and salt permeability to the structural parameters. Additionally, we find that significant pumping energy is required to overcome frictional losses in the spacer-filled feed channel and achieve suitable mass transfer on the feed side of the membrane, especially at high operating pressure. The effect of operating conditions on the water flux in a PRO module was investigated, both the reduced selectivity and increased pumping energy requirements we observe in PRO will significantly diminish the obtainable net energy. Our study is good reference for design the PRO module.

KEYWORD: press-retarded osmosis; concentration; pressure; power density

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Theoretical Calculation on Trappable Tidal Current Energy in Tidal Channel

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ABSTRACT:
Based upon the internal relationship between total cross-section power and amount of trappable tidal currents, the formula of trappable tidal current energy and mathematical expression of its rate in tidal channel were deduced. It thus obtained a more rigorous mathematical assessment calculation way of tidal current energy. According to the mathematical derivation results, maximum trappable rate of tidal current energy in tidal channel was merely related to the resistance and terrain. Xiushan Channel was selected by this paper to establish 2D hydrodynamic mathematic model for practical calculation. According to the theoretical formula and mathematic model results, theoretical maximum trappable rate of tidal current energy in Xiushan Channel was 8.14×10^4 kW. It demonstrated that the theoretical maximum trappable rate of tidal current energy in tidal channel is only a fraction of total cross-section tidal current energy.

KEYWORD:Tidal Current Energy, Theoretical Calculation, Installed Capacity, Mathematical Model

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Numerical study on array optimization of tidal stream turbines in Zhoushan demonstration project

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ABSTRACT:
Tidal stream energy, one of the promising renewable energies, has attracted more and more attentions of coastal society in the past years, and one demonstration project for exploring the tidal stream energy with a total capacity exceeding 1 MW is recently launched in Zhoushan area, China. The waterway between Putoushan Island and Hulu Island has been initially selected as the project site for deploying tidal stream turbines, and one of main concerns is about the array optimization of turbines which is obviously related to power generation. In this study, the open source code OpenTidalFarm is applied to numerically reproduce the tidal hydrodynamics around the project site and to investigate the impacts of tidal stream turbines. The numerical results are compared with the field measurements in terms of water surface elevation and flow current for the model validation. When the total number of turbines installed for electricity production is fixed, the turbine deployment is automatically optimized to achieve a higher electricity power. The numerical results also indicate that the turbine array has a large impact on the local hydrodynamics. The current velocity is significantly reduced in the upstream and downstream of turbine array due to the power take-off, which it is slightly increased at two sides of turbine because of the space blockage by turbines. These preliminary results are valuable for determining the turbine deployment and assessing the impacts of the demonstration project on local environmental hydrodynamics.

Dynamic Response and Structure Optimation for Spar Foundation of Offshore Wind Turbine under Combined Action of Loads

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ABSTRACT:
Wind is a rapidly growing renewable energy source, and offshore wind power generation has become a new field in wind power generation. A large part of the offshore wind resource is however located in deep water, which requires floating wind turbine foundations to exploiting wind energy. In harsh marine environment, spar foundation is an economical and promising floating foundation for offshore wind turbine. In this study, the surge, heave and pitch characters of spar foundation under combined action of wave, wind, current loads was analyzed by using of AQWA module of ANSYS. The effects of different parameters of anchor chain on spar foundation motion response were investigated. Based on the research, a new optimized spar foundation, which had typical eight well-distributed chains locating in the floating body and other four vertical chains being in the bottom of soft tank, was put forward. By comparing analysis, it indicated that the motion response and the anchor chain stress state of optimized spar foundation were both significantly improved relative to non-optimized foundation. The results of parameter design and dynamic analysis could offer reference and basis for further development and design of spar foundation.

KEYWORD: Offshore wind turbine, Spar foundation, Optimation, Dynamic respons

Reliability-Based Multi-Criteria Decision Making for Tripod Support of Large-Capacity Offshore Wind Turbines

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The depletion reserves and negative effect on environmental issues of fossil fuel, such as climate changes, global warming, greenhouse gasses, and deteriorated pollution, have forced human beings to turn toward alternatively sustainable energy. Offshore wind generation is expected to increase significantly for obvious advantages. Different structural concepts are proposed for offshore wind turbines (OWT) servicing in harsh marine environments, which present a lot of challenges significantly greater than onshore systems. Monopiles are the most used substructures until now by a large number of installed turbines at shallow water around the world. Jackets are supporting the largest turbines by 5–6 MW rated power at relatively deep water, which can be well traced in offshore oil&gas industries. Tripod support targeted here is a relatively lightweight three-legged steel jacket compared to a standard jacket structure, which is a feasible bridge between two concepts above. Fewer studies have yet been performed on the comprehensive evaluation and decision making of tripod system employed large capacities turbines in offshore wind farms. Decision-making problems associated of a proper optimal design are a crucial research topic in the field of offshore wind energy engineering. It needs the consideration of the entire system, including foundation, support structure, and nacelle as one integrated unit. Selection of optimum choice of support system should be based on more than absolute engineering performance because of the complexity of socio-economic and biophysical properties of offshore structures which are characteristic with high cost and potential impact on the marine environment. Research focusing on the environmental interaction of offshore wind farm is booming, while most of them go deep into single affect factor. In view of the complexity of socio-economic activities of offshore wind farms, current research proves to be subjective for too many factors coming from hypothesis and experience. More refined engineering analysis method combing with management science would be good tries for incorporating environmental consequence impacts and economic evaluation into decision making for proper support structures of OWTs. The paper presents a new approach based on entropy coefficient to consider objective weight into weight selection for the purpose of avoiding non-determinacy and optional judgements resulted from subjective opinions. The tripod support structures on the conditions of different water depth are used as models for dynamic property optimization. The reliability of optimum solutions resulted from the Design Optimization of ANSYS is applied as one of the attributes to the decision matrix of the Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) which is used for evaluation the relative closeness of each option to the ideal solution. The presented method would contribute effectively towards more objective and informed decision making of the OWT support structures as well as other fields.

CLIMATE CHANGE AND THE MARINE LEISURE INDUSTRY

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Keywords: Climate change, marine leisure industry, recreational harbours, marinas

Theme : Coastal Engineering and Hazard Prevention

Recreational harbours not only serve for boat berthing, but are also catalysts for sporting events, gastronomy, hotels, tourist apartment complexes, etc. Therefore, they often play a major commercial role in coastal tourist areas. The core water-related functions of a marina include the provision of a safe berth, proper mooring and dry-docking, dredging and depth maintenance, navigation advice, managing debris and environmental concerns, weather preparedness, and managing resulting damage. As on-shore businesses, marinas provide shower and toilet facilities as well as garbage places. Additionally, they often provide the storage of vessels ashore especially outside the boating season as well as repair and maintenance services for costumers' boats. Furthermore, boat rental services, services for leisure activities like bike rentals as well as gastronomic and accommodation services are offered.

Due to their location at the intersection between sea and land, marine facilities are most vulnerable to changes of all water related parameters like mean relative sea level, storm water levels, wind waves and swell, tidal regime, sedimentation rates, waterborne immigration of species, water salinity and acidity. Furthermore, recreational harbours can also be affected directly by temperature, precipitation and wind changes with respect to e.g. length of boating season, pavement durability and storm-water drainage system capacity.

In the presentation, phenomena of climate change and their possible impact on recreational harbours will be described. Based on this inventory of climate change impacts on port assets, possible business consequences, both opportunities and risks, will be described, followed by possible structural and non-structural adaptation measures. The information will be presented in the form of a matrix, which can be used by planners, authorities and in general stakeholders as a tool for climate change adapted planning and operation to meet risks but also opportunities of climate change processes for recreational harbors.

The author is member of the PIANC Working Group 178 "Climate Change Adaptation for Waterborne Transport Infrastructure' founded in 2015.

A preliminary study on estimating wave power under natural conditions based on measured wave elements

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ABSTRACT:
According to the linear wave theory, the wave power for a random wave can be expressed as the integral of wave power corresponding to each frequency. In the assumption of infinite water depth, the wave power is estimated by the product of square of significant wave height and the period of energy with a coefficient of 0.5.But in finite water depth, the coefficient has changed. Based on a large amount of field data obtained from 6 wave observation stations offshore China, the coefficients are calculated with different wave elements using the basic form of approximate formula. The results show that the error calculated using the formula of H_{m0} and $T_{1/10}$ or$T_{1/3}$ is minimum and there are little change in different sea area. As a conclusion, the formulas suitable for China sea area are proposed: $P_w = 0.49H_{m0}^2T_{1/10}$ or $P_w = 0.51H_{m0}^2T_{1/3}$.

KEYWORD:random wave；wave energy；wave power；China sea area

Design and Optimization of Mooring System of Offshore Wave energy Converter

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ABSTRACT:

As the land resources is decreasing day by day, the exploitation of ocean resources are receiving more and more attention. However, the shortage of energy supply in open sea is a hard problem needed to be settled urgently, which restricts the usage of ocean resources. The development of offshore wave energy converters provides a promising way to solve this problem. The devices turn unsteady wave energy into steady power (eg. electricity) for islands or marine instruments on the spot, so that living standard of island residents and normal tasks of offshore equipments are ensured. While working in the ocean under long-time and serious condition, a stout and reliable mooring system is essential to the stably and safety of WECs. In this paper, the Sharp Eagle "*WANSHAN*", which invented by Guangzhou Institute of Energy Conversion has been successfully tested nearby Wanshan island, Zhuhai, is taken as a calculation case. Focusing on the reliability, mechanical properties of Buoy-Sinker catenary mooring systems were calculated and then compared with anchor chain catenary mooring system. According to mechanical performance, the mooring system was redesigned and optimized. When working in extreme sea conditions, the wave energy absorbing buoys will be locked and immobile. Based on the positions of wave energy absorbing buoys, the floating states were classified into three types, and the influence of different positions was evaluated. After that, three submergence states, zero-submersible, semi-submersible and all-submersible, were set and the effect of diving depth was estimated. At the end, the impact of different water depths, 30m, 100m and 500m, on the mooring system is presented.

KEYWORD:wave energy converter, Semi-submersible platform, mooring system, Buoy-Sinker

catenary

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Design, simulation and testing of the hydraulic power take off system for the Sharp Eagle wave energy converter

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Abstract:A wave energy converter (WEC) concludes an energy capture system and a power take-off system (PTO). The PTO is the key of the efficiency of a WEC. The hydraulic PTO due to convert the intermittent and unstable wave power into sustained and stable electric power makes it an extensive application for WECs. This paper describes a hydraulic PTO employed in the Sharp Eagle WEC. The design and the development process of the system is presented, including structure and working principle, power generation system and hydraulic system, physical model tests at laboratory and real sea experiments at full scale. At last, results are also presented and analyzed, shows that the PTO is important, helpful and valuable for a WEC.

Key words: wave energy converter (WEC); power take off (PTO); Sharp Eagle wave energy converter; conversion efficiency; hydraulic control

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Wave power focusing due to the Bragg Resonance

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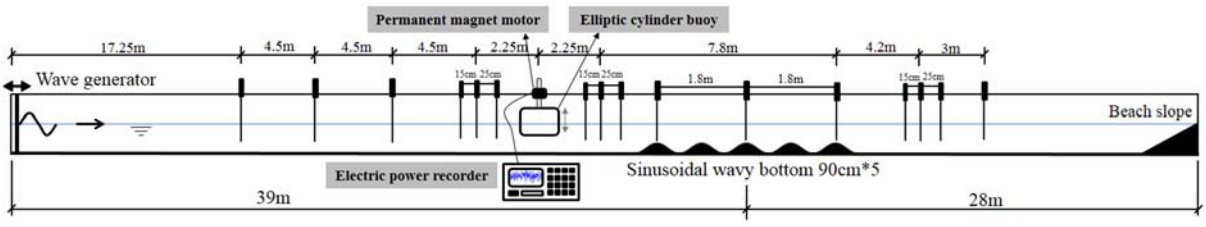
ABSTRACT:

Wave power has been drawn more attention for the development of this typical renewable energy due to its immense energy potential along the coastlines worldwide. Although noticeable progresses of the wave energy exploitation have been made in the past few decades, it still encounters many problems especially the relatively low value of its conversion rate.

In order to improve the conversion technologies of the wave power, many efforts have been devoted by optimizing the wave energy convertor and the power take-off system mechanically and electrically. However, unlike the optimization methods above, the present research focuses on enhancing the wavy energy by amplifying the ocean free surface fluctuations based on one classical type of the wave-bottom resonant interaction 'Bragg resonance'. This interaction usually exists in the nearshore area with submarine periodic wavy bottoms (*e.g.* serial sandbars or continuous artificial submerged breakwaters). When the wavelength of the continuous periodic wavy bottom is the multiple of the half free surface wavelength (especially the free surface wavelength is twice the bottom wavelength), the Bragg resonance occurs. Then strong reflected waves are induced and intensive oscillations (partial standing waves) are generated on the seaward free surface above the wavy bottoms. Once generated, the maximum wave height of the partial standing waves will be greater than the previous incident waves. So this resonance becomes an alternative to increase the wave amplitude and enhance the energy capture at the regions with wavy bottoms. Therefore based on a wave flume and an oscillating buoy wave energy convertor, the experiment was performed. Five fixed continuous sinusoidal wavy bottoms were installed to induce the Bragg resonance. The wave energy absorbed by the buoy was transferred from the mechanical energy to electric energy by a permanent magnet motor. In this experiment, the wave energy generation properties with and without the Bragg resonance were compared. And the cases with the combination of various water depths, wave periods and wave heights were involved. The results showed that the active power captured by buoy rose dramatically when intensive partial standing waves were generated by Bragg resonance. The reflective coefficient could reach nearly 0.5 in some resonant cases. In the presence of the wavy bottom, the captured power at the selected antinode locations reached ten times at most on the resonant conditions in some specific cases comparatively. It shows that it is feasible to enhance the wave power extraction by Bragg resonance in nearshore regions.



Experimental set-up of the wave-power enhancement by Bragg resonance

Ocean Engineering

Intensity Classification of Typhoon Impacts to Coasts Based on the Joint Effect of Tide Level and Wave Height

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Abstract

Current classification methods for typhoon intensity are based on the maximum wind speed (or central pressure) of the typhoons. These methods are not sufficient for assessing the potential damage that a typhoon can cause along the coast. A new idea is proposed in this study to classify the intensity of a typhoon based on its impact on the coast. Waves represent the main and direct source of impact on coastal areas, particularly during a typhoon. The total tide level, which includes the components of storm surge, wind setup and wave runup, is an important factor in the assessment of coastal damage. Therefore, the proposed typhoon intensity classification is based on the joint effects of waves and tide level. The Poisson bivariate compound extreme value distribution is used to construct the joint distributions of the tide level and wave height according to the best fit of the marginal distributions and bivariate copulas. Simultaneous TL and wave height data from 59 typhoons in Hualien and 75 typhoons in Hsinchu are used for the model calibration. Field investigations of coastal damage during typhoons are employed for validation. The results show that the proposed typhoon intensity classification grade is consistent with the actual damage.

Keywords: Intensity classification, typhoon, compound extreme value distribution, copula, tide level, significant wave height

Boundary element simulation of wave interaction with underwater floating structures

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Abstract

The problem of underwater floating structures subjected to ocean waves is considered in this study. A boundary element numerical model is developed to solve the problem. The two-dimensional problem is considered, and the structure can have heave, sway, and roll motions. The linear potential wave theory is applied to describe the wave problem, and a boundary element method is used to solve the problem. The unknown wave potentials are expressed as superposition of scattered and radiated waves of unit amplitude, which are solved using the boundary element method, separately. The wave potentials are substituted into the equations of motions of the floating structure, which is then solved for the amplitudes of the structural motions. Accuracy of the present numerical model is first examined. The principle of energy conservation is used for problems involving reflected and transmitted waves, as energy dissipation is not considered in the analysis. The wave form symmetry is used for the heave radiation problem, while the wave form asymmetry is used for the sway and roll problems. Using the present numerical model effects of structural width, height and underwater submergence on wave reflection and transmission, as well as characteristics of structural motions can be investigated. So far, the calculated results show that (1) the height of the structure can block incident waves to some degrees producing higher reflection, (2) the less underwater submergence the less wave transmission behind the structure, (3) the less underwater submergence can induce higher sway motion of the structure and lower heave motion, (4) the roll motion of the structure, on the other hand, depends on wave conditions above the structure.

Violent sloshing wave interaction with baffle in three-dimensional numerical tank

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ABSTRACT:
Sloshing waves must be considered for almost any moving vehicle or structure containing a liquid with a free surface and can be the result of resonant excitation of the tank liquid. A partially filled ship tank can experience violent liquid motion when the ship motions contain energy in the vicinity of the highest natural period for the liquid motion inside the tank. Impact between the liquid and the tank structure is then likely to occur. A baffle mounted perpendicular to the tank boundary is considered to be an effective too in reducing sloshing waves. In this study, the liquid sloshing phenomenon in a three-dimensional (3-D) rectangular tank with a baffle is investigated numerically. The volume of fluid (VOF) technique coupled with the virtual boundary force (VBF) method is used to simulate sloshing wave interaction with an anti-slosh baffle. The numerical model solves the incompressible viscous Navier-Stokes equations on the moving coordinate system by using the finite difference method. For verification of the present numerical model purposes, laboratory experiments of liquid sloshing in a 3-D rectangular tank excited by oblique movement are conducted. The simulation results are also confirmed with available analytical solutions. Good agreements are obtained. The attenuation effect of two types of bulkhead, i.e., lower mounted baffle and upper mounted baffle are investigated by varying the forcing frequency. Effects of turbulence on violent sloshing wave interaction with baffle will be also discussed. The baffle attenuation effect on sloshing wave has the characteristic of frequency and location alternative. The time evolution of free surface fluctuation, pressure, and velocity field are highlighted.

Analysis of linear wave forces exerted on a submerged horizontal plate

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ABSTRACT:
A lot of coastal engineering structures can be simplified as submerged horizontal plates, for example, plate-type breakwaters, very large floating structures (VLFS), wave energy converters. As an effective offshore breakwater, the submerged horizontal plate may have a minimum effect on nearshore current and sediment transport against other types of breakwaters. The scattering problem of a submerged plate of finite thickness is solved by linear wave theory and eigenfunction expansion method.

There are many studies of the scattering of a submerged horizontal plate. Reflection and transmission over submerged horizontal plates were widely investigated analytically based on the potential wave theory (Siew and Hurley, 1977; Patarapanich, 1984a, 1989; Liu et al., 2009; Yu, 2002). To our knowledge, previous studies mainly focus on wave scattering of thin plate and the interaction of waves and thick plate rarely discussed.

In our work, the scattering of monochromatic waves over a submerged plate with finite thickness are investigated based on small amplitude wave theory and the method of matched eigenfunction expansions. The geometrical sketch of the problem is shown as shown in Fig.1. With certain convergence tests and verifications of the present analytical model, the analytical results are compared with our laboratory experimental data in terms of wave reflection and wave forces as shown in Fig. 2 and Fig. 3. The comparison shows the theoretical model gives reasonable accuracy for the finite-thickness plate even with significant nonlinearity above the plate. In the last part, the effects of the plate width, submergence depth and the plate thickness to the reflection, wave force and moment are also discussed basing the present theoretical model.

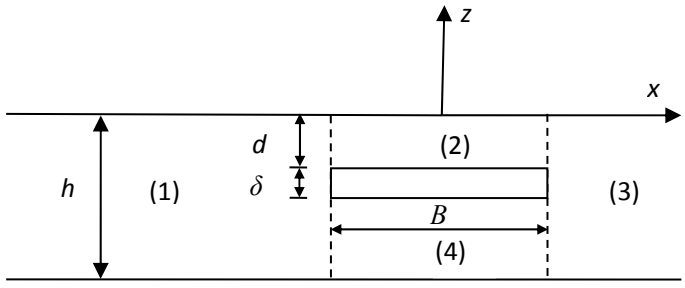


Fig. 1 The geometrical sketch of wave interacting with a submerged plate.

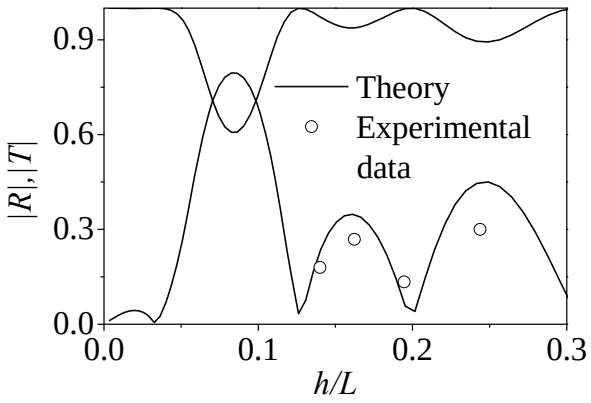
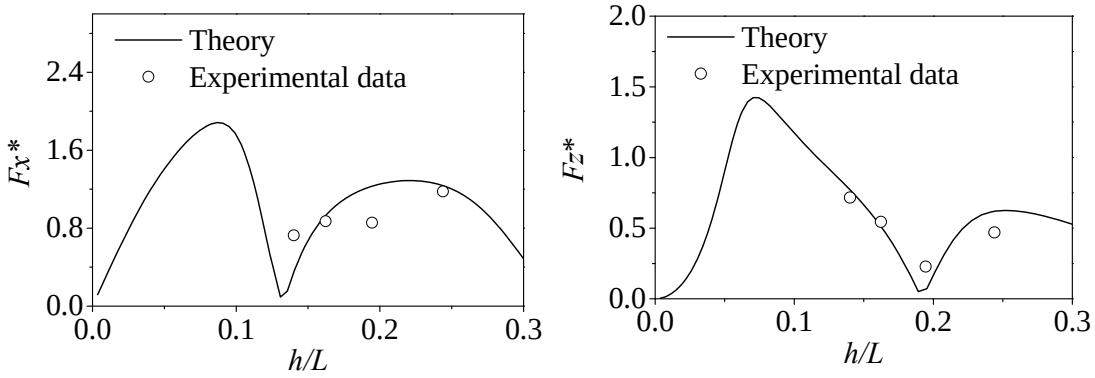
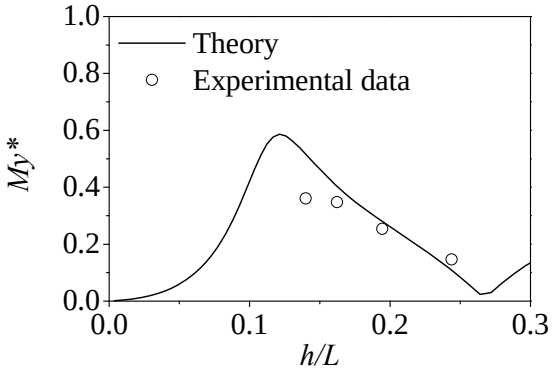


Fig. 2 Reflection and transmission coefficients



(a) horizontal force (b) vertical force



(c) overturning moment

Fig. 3 Normalized wave loads amplitudes of theoretical results and experiment measurements in terms of vertical force and overturning moment.

Experimental and numerical investigations of wave resonance in gap between two floating barges with various breadths

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ABSTRACT:

Experimental and numerical examinations are conducted to investigate the influence of body breadth on the fluid resonance in the narrow gap between two fixed floating barges. The laboratory tests are carried out in a wave flume with constant water depth h=0.5 m and wave height H_0=3.0 cm, where two barges with different breadths (B_1=0.2 m for the leading barge and B_2=1.0 m for the rear one) are firmly arranged, leaving a small separation of B_g=5.0 cm between them. The experimental results of wave amplitude in gap, reflection and transmission coefficients and phase difference between the wave motions in gap and in front of leading barge are presented for various wave frequencies. The numerical investigations are based on a modified linear potential flow model with damping term. The calibrations for the damping coefficient, by using the resonant wave amplitude in gap, show that it is dependent on the breadths of barges. With the calibrated damping coefficient, the modified potential model is able to produce reasonable predictions for the reflection coefficient Kr, transmission coefficient Kt and the dissipative quantity $1-Kr^2-Kt^2$, indicating that the introduced damping term correctly reflects the damping/dissipative effect. The numerical investigations with conventional potential model show that the increase of the barge breadths leads to the decrease of the resonant frequency. However, for specific total breadth, namely B_1+B_2=constant, the resonant frequency varies nonlinearly with the breadth ratio, and the minimum resonant frequency appears at B_1/B_2=1.0.

Interaction of oblique wave and a twin-box system with a narrow gap

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ABSTRACT:
For effective exploitation and transportation of marine oil and gas resources, two marine objects in side-by-side operation, such as the ship-by-ship operations, a LNG carrier alongside a terminal and the moonpools of the FPSO (Floating production storage and offloading facilities), are widely used and have triggered extensive research studies in the last two decades. If the wave frequency is close to the resonance frequency of the narrow gaps of these modules, significant increases in wave run up in the gaps and in wave loads become serious threats to structure safety. The mechanisms of the occurrence of resonance and its impact on the structure safety have received worldwide attention. Many theoretical analysis, model experiments and numerical simulations have been conducted. However, most of the existing studies are limited to 2D, i.e. the structures are infinitely long in the dimension parallel to the gap. Thus, the real three-dimensional characteristics of the fluid dynamics in the gap cannot be presented. In the present study, the influence of incident wave angle varied from 0° to 90° on the water resonance in a gap between two fixed barges is studied based on the second-order time domain potential flow model. In the numerical model, the waves in a circular computational domain with the structure at its center are simulated. A damping zone is placed on the free surface at the outskirt of the domain to absorb the outgoing scattering wave. The results show that the incident wave angle does not influence the resonance frequency in different mode apparently, but it affects the distribution of maximum wave surface elevation at resonance.

KEYWORD: Narrow Gap; Resonance; Oblique Wave; Numerical Simulation.

The Swells of the East China Sea

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ABSTRACT:
In the recent decades, more and more human activities, including different kinds of marine structures and large ships, have been present in the East China Sea. It is necessary to fasten our attentions on the marine safety issues, particularly on the extreme waves. Because it has been known that the density of extreme waves may increase with Typhoon in the future with the global climate changing. The extreme waves can be induced not only by Typhoon in summer, but also by East Asian cold waves in winter for this special sea area. And the swells also can be very dangerous because the swells may result in the resonance with floating structures, including the ships. Focusing on the investigation of swells in the East China Sea, the hindcast for waves in the past ten years will be performed by the numerical model Wave Watch III based on the historical climate data. The numerical calculation domain covers the whole North West Pacific. Then the swells will be separated and analyzed from the simulated wave fields. Both the characteristics and the generation mechanisms of the swells will be investigated. Particularly, the swells, which propagating across the Ryukyu chain from east to west, will be analyzed in details.

KEYWORD:Swell, East China Ocean, Propagation characteristic

Numerical Study of Ballast Weights Scheme for Scaled Model Experiment of Large Offshore Floating Structures

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Offshore engineering has been one of the most innovative branches of engineering in recent years. As the offshore activities for the extraction of hydrocarbons extend to regions of increasing water depth, many large structural concepts have been developed and engineered. The design of these complicated structures for accident-free operation in hostile marine environment is vital for the continued growth of offshore industry. Large offshore structure is dynamically sensitive, needing to be predicted with rigorous approach to account for the dynamic interactions within the system. At present, it is unfeasible to employ fully coupled numerical simulation on a routine basis due to the prohibitive computational time for such complex structure. Arguably this can be best carried out through small-scale well-controlled laboratory experimental investigation. However, it can still become a burdensome undertaking when dealing with certain laws of similarity. Consequently, under this process, it is principally compulsory that the ratios of inertia forces, i.e. mass properties with equal acceleration, between model and prototype should be same as other corresponding forces. As a result, related weight calibration and adjustment are usually performed in practice after the model construction is complete. More specifically, model's weight adjustment by multi-region arrangement of ballast weights most often must fit with a preexisting geometrical structural framework and the precise operation is really a multi-objective combinatorial optimization problem with multiple specified constraints. It is time-consuming and hardly obtains a feasible scheme by traditional trial methods to deal with this problem. Therefore, in this paper, a reliable method based on improved Genetic Algorithm is proposed to generate proper ballast weights scheme with additional optimal performances taken into consideration. A mathematical model is built using minimizing discrepancy between the mass properties of ballasted model and the target value. The positions of ballast weights are taken as the design variables, limited ballast weight shifting within the sequential adjustments for several working conditions as the extra objective, the guaranteed error limitation of inertial moment and a number of discrete regions for permitted ballast weight placements as the constraints. A special crossover operator is introduced to perform the reproduction of valid solution under constraint domination principle. At the end of this paper, a real cases of a deep water semi-submersible platform is conducted to demonstrate the feasibility and effectiveness of the proposed approach. The work highlights the effect of ballast weight scheme and recommendations are made regarding the development of efficient modelling techniques.

Numerical simulation on sloshing in a sway tank with a submerged horizontal perforated plate

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ABSTRACT:
Fluid motion in partially filled tanks can cause large hydrodynamic loads if the frequency of tank motion is close to the natural frequency of the tank. The inherent damping of a tank without inner structures has been found to be insufficient for suppressing violent sloshing motion (Fediw et al., 1995; Tait et al., 2004). Various approaches have been proposed to increase the inherent damping of the tank (Faltinsen and Timokha, 2001; Molin and Remy, 2013; Tait et al., 2005). It has been found that perforated plates can efficiently dissipate the energy of sloshing meanwhile improve the stability of the tank system. Recently, Jin et al. (2014) have experimentally showed that a submerged horizontal perforated plate can serve as a good sloshing restrain device in a tank. But, the flow details around the horizontal perforated plate and the energy dissipation mechanism of the plate need to be further clarified.

In this paper, a numerical model based on OpenFOAM (an open source CFD software) is used for simulating the sloshing in a 2D tank with a submerged horizontal perforated plate under sway motion. The CFD results are first compared with the theoretical solutions of Linton and McIver (2001) and Molin and Remy (2013) for sloshing in tanks without inner structures and experimental results of Jin et al. (2014) for sloshing in a tank with a horizontal perforated plate. Then, the forced sway motion of the tank with a submerged horizontal perforated plate is carefully simulated. In the simulations, the tank length L is 1m and the water depth h in the tank is 0.5m. The porosity of the horizontal plate varies from 0.1 to 0.5, and the plate submerged depths are 1/3h, 1/2h and 2/3h, respectively. The forced oscillated amplitude of the tank is 0.0025m and the forced oscillated frequencies cover the first and third natural frequencies of the tank without inner structures.

Based on numerical simulations, the features of the free surface elevation are further confirmed and the flows around the perforated plate are demonstrated. The simulation results show that the free surface elevation can be restrained well by the horizontal perforated plate with small submerged depth and porosity. The variation of porosity for the plate at small submerged depth causes more complicated effects on both the surface elevation and the resonant frequency. This study may give better understanding on the sloshing restrain effect of a horizontal perforated plate. The flow field analysis clearly reveals the mechanism of energy dissipation in the present tank system.

KEYWORD: Sloshing, horizontal perforated plate; OpenFOAM, free surface elevation, flow field

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Analytical Method of Buried Steel Pipelines Subjected to Strike-slip Faults

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ABSTRACT:
Based on the summary of the existing analytical methods of buried steel pipelines at crossings with active strike-slip faults, an improved analytical methodology herein is proposed. Based on Karamitros model, the Ramberg-Osgood stress-strain relationships of pipe steel and the effects of nonlinear soil-pipeline interaction in both the axial and transverse directions are taken into account. Compared with existing analytical methodologies and 3D nonlinear finite element analysis, the analytical methodology presented is suitable for engineering applications due to exact and conservative results.

Study on the aerodynamic performance of the floating wind turbine under the condition of pitch

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ABSTRACT:
As the core device of wind energy conversion to electric energy, wind power generator has been widely used in land and sea.However, at present, the research on the offshore floating wind turbine is seldom given to the aerodynamic performance of the wind turbine when it is driven by the floating body.Therefore, the effectiveness of CFD numerical simulation for horizontal axis floating wind turbine is studied.The effects of the same flow velocity and different pitching angle on the calculation results of the wind turbine are discussed.Finally, it is concluded that the air flow has a certain effect on the output power of wind power generator and the surface pressure and the resistance coefficient of the blades.At the same time, the tail flow field of each position is analyzed.The theoretical basis and reference data are provided for the research of offshore wind turbine generator.

KEYWORD:floating type; wind power generator; pitching; aerodynamic performance;

An Investigation on Efficient Methods for Non-Gaussian Fatigue Damage Assessment of Mooring Lines

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ABSTRACT:

Mooring lines of the platform keep staying in seawater with strong causticity and being typically subjected to secular bimodal loads which are commonly composed of a wave frequency (WF) component and a low frequency (LF) component induced by the wave forces. As a result of the nonlinearities of the geometrical characteristics, the dynamic line loads and the second-order responses, both the WF and LF components, are in principle non-Gaussian. Under this condition, non-Gaussianity should be adequately included into the fatigue analysis of mooring lines, since it might considerably increase the rate of fatigue damage accumulation. However, of the traditional assessment methods, time-domain analysis method is rigorous but time-consuming, and spectral method can be time-saving while the corresponding simulated mooring tension in application is generally assumed as stationary and Gaussian which always leads to a significant underestimation of fatigue life.

In this paper, the primary objective is to investigate the existence of non-Gaussian in random mooring line responses, and then try to propose an improvement for estimating the fatigue damage of non-Gaussian bimodal processes. As a result, a comprehensive fatigue analysis is conducted on the mooring lines applied for a semi-submersible platform, with special attentions focused on the distribution of rainflow cycles and the fatigue damage of the non-Gaussian responses. The discrepancy arising from several traditional spectral methods involving broad-band correcting formula or bimodal random approximation are reviewed and compared to investigate the effects of non-Gaussian factors. Furthermore, an improvement based on probabilistic analysis and Jiao-Moan's theory has been proposed to increase effectiveness of calculation process. Then, by means of comprehensive coupled numerical simulations via analysis software SIMO and RIFLEX conducted on offshore mooring system, relation of the distributions of counting cycle and the accuracy of all cited spectral methods are studied with a benchmark of time-domain rainflow method. At last, critical recommendations and conclusions are concluded for the preliminary design stage of offshore mooring system.

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A FFT-based spectral method to obtain dynamic responses of floating wind turbine foundation considering non-zero initial conditions and characteristics of the South China Sea

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ABSTRACT:
In the present paper, a spectral analysis method is articulated to calculate dynamic responses of a floating wind turbine foundation under the condition that the initial displacement and velocity of the foundation are nonzero. More specifically, initial velocities and displacements are transformed into corresponding pseudo forces, which join the external wind-wave loads to induce the dynamic responses of the floating wind turbine foundation. Thanks to the linearity of the motion governing equation, dynamic responses of a system with non-zero initial conditions are equivalent to those with zero initial conditions subjected to a sum of external loads and the pseudo forces corresponding to the specific nonzero initial condition. Therefore, the conventional spectral analysis, with the help of the pseudo-force transformation, could be applied to obtain the dynamics responses of the system with non-zero initial conditions.

Although the pseudo-force transformation has long been invited to tackle general structural dynamics problems, the method has yet been used to obtain dynamic responses of a floating object in the complex wind-wave environment. The original idea of taking the non-zero initial velocity and displacement of a bouncing object as pseudo forces has been extended to describe an initial state of the complex system of a floating wind turbine foundation. The resulting force spectra are examined in the context of discussing the spectral characteristics of certain initial conditions of the floating object when the object is excited by conventionally modelled waves. More specifically, the influence of initial displacements and velocities on the spectra of the dynamic responses of the floating object is discussed when the base wave spectra are modelled by the conventional wave theories.

KEYWORD: Floating wind turbine; Non-zero initial condition; Spectral analysis; South China Sea

Design and analysis of a novel adaptive blade for horizontal axis tidal current turbine

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ABSTRACT:

Tidal currents flow in only two directions during a tidal cycle. Tidal current energy has enormous potential as a predictable, reliable, renewable resource for commercial scale electricity generation. Turbine blades are key components in a tidal power generator to convert hydropower to electricity. Conditions such as reverse of flow direction and relatively slow speed of tidal currents make it extremely difficult to design efficient tidal turbine generator. This paper presents a novel, passive, adaptive blade with good starting performance at low speed. We analyzed and validated the principles behind pitch adjustment that is automatically adaptive to tidal current speed and direction for forward-swept, backward-swept and straight blades using both computational and experimental methods. The role of the proposed water-powered pitch compensation wing was analyzed. With the newly designed blades, tip speed ratio can be achieved in a small range (±20°) after proper adjustment of sweep angle and main shaft position. Computational analysis and model test experiment were conducted to validate this novel design.

KEYWORD: Tidal current energy; adaptive, forward-swept blade, backward-swept blade, straight blade

Operation Control for Tidal Stream Turbines

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ABSTRACT:
Marine energy generation systems have gained extensive attention in the past decade. The greatest advantage of tidal current energy over other marine energy sources is its lower dependence on the weather. Tidal stream generation system consists of an energy capturer, a shaft, a gearbox to reach a high rotational speed, a generator, a power converter and submarine power cables for transmission of the generated energy to shore. In such a system, the monitoring and control is very important for the system operation. In this paper, the control system for tidal stream turbines is introuduced and the operation control scheme is proposed, the operation control procedue includes system start up, stop, power control, protection etc..

The control system shown in Fig.1 is designed to overall test the Tidal stream system. It may be applied to evaluate relationship among the current speed, current direction, the pitch degree and the captured energy. The maximum power point tracking (MPPT) algorithm, the system operation process such as, etc. will be evaluated and tested by the test system. The test system is composed of operation process control system and high precision power electronic load (PEL).

The operation process control system is the core of the test system. It will decide the tidal current energy generator the operation states by the information of ocean environment and generator sets. By the model analysis, the pitch angle and the output power will be set. The pitch control system in the tidal stream turbines and the power electronic load will be controlled to the setting value. All the information during will be store in the local storage and will be sent to the monitor center by GPRS. The data will be very useful to analyze the system model and the capability of capture energy.

The PEL can adjust the load power resistance in different ocean conditions. And it may work constant power control mode, constant voltage control mode, constant current control mode and constant resistance control mode. A variable structure fuzzy control algorithm is designed to control the PEL, and the performance is improved than the traditional PID control algorithm.

The main features of operation control are listed as follows: **1)** the blade angle control device can synchronously change the blade angle by the current information. Then the unit can achieve maximum power point tracking under the rated flow rate. The braking function of the blade angle control device can provide safety protection for the unit; **2)** the PEL adopts uniform interface, and can be compatible with all kinds of ocean test equipment. It can be used to test the basic performance of the new type power generation equipment which is newly designed. Then improvement suggestions can be put forward to perfect the functions of them; it can also be used to test the ocean power generation which has already created, and realize the maximum power point tracking (MPPT); **3)** the blade angle control device and the PEL can work synergistically to achieve MPPT of the tidal current energy generator under different

current condition.

The operating data shown in Fig.2 of the system which has been obtained and analyzed, indicates that the system has lots of advantages, such as stable operation, high stability on regulation precision. With technological advancement in the monitoring, diagnostic, control and protection mechanisms gradually incorporated, the perfect operation control will allow marine energies to be widely commercialized and contribute significantly to the overall global energy production.

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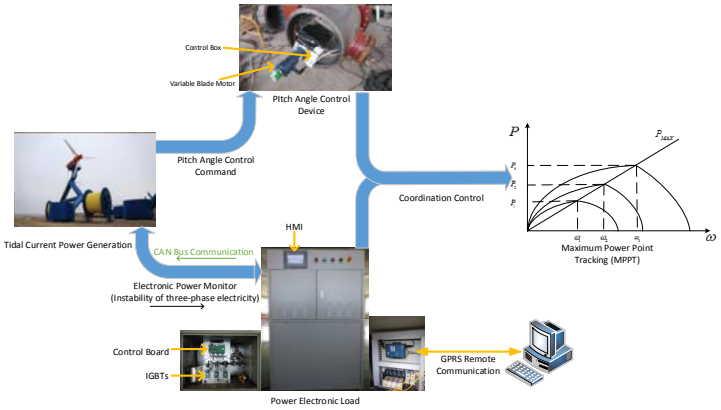

Fig1. Tidal stream turbine system

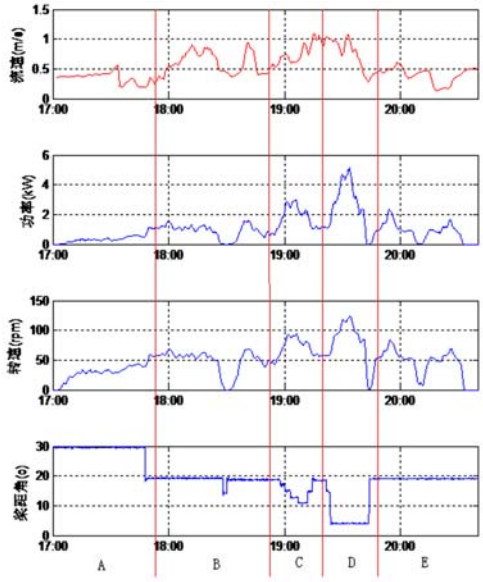

Fig2. Real-time operation curves.

Dynamic response of A Combined Mono-pile Wind Turbine and Heave-type Wave Energy Converter System

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ABSTRACT:

Due to natural correlation, ocean wave energy may also be considerable where the offshore wind energy resource is rich, the combined concept of wind turbine (WT) and wave energy converter (WEC) systems makes it possible to utilize both wind and wave energy simultaneously while sharing the same supporting structure system and cables, as well as using the area of the ocean more efficiently.

In present work, a novel concept by combing a mono-pile wind turbine and a heave-type wave energy converter has been proposed, that is referred as the 'MWWC' (Mono-WT-WEC Combination) system herein. Concept feasibility study has been carried out by doing coupled aerodynamic and hydrodynamic numerical simulation in the time domain. Aerodynamic loads and output wind power of the NREL 5MW wind turbine are determined by the NREL Aerodyn code, based on BEM method. Hydrodynamic loads of the mono-pile and the WEC are calculated by the AQWA code, which is available for modeling multi-body systems including both mechanical and hydrodynamic couplings between the mono-pile and the WEC. As a novel concept, the power-take-off (PTO) system of the WEC has been simplified as a heave-direction linear damping spring between the mono-pile and the WEC bodies, so the output wave power can be estimated by the damping force between the two bodies due to their relative heave velocity.

Firstly, the effect of different PTO parameters on the performance of the WEC's output wave energy under typical wave cases has been investigate, and a preliminary optimization value for the PTO's equivalent damping stiffness has been proposed; secondly, the additional hydrodynamic loads due to the WEC body on the mono-pile foundation has been investigate using coupled wind-wave induced analysis under typical operational sea cases. Finally, the extreme responses of the MWWC system have been investigated in order to check its safety under possible extreme sea conditions, and the potential challenging areas of the MWWC system has been highlights.

KEYWORD: combined wind and wave power system, mono-pile, wind turbine, wave energy converter, dynamic response.