

Sixth International Workshop on Seawater Sea-sand Concrete (SSC) Structures Reinforced with FRP Composites

Hong Kong, China, 25-26 February 2023



THE HONG KONG
POLYTECHNIC UNIVERSITY
香港理工大學



DEPARTMENT OF
CIVIL AND ENVIRONMENTAL ENGINEERING
土木及環境工程學系



RESEARCH INSTITUTE
FOR SUSTAINABLE URBAN DEVELOPMENT
可持續城市發展研究院



CEE/CSE 50th
Anniversary



THE HONG KONG
INSTITUTION OF ENGINEERS
香港工程師學會

Structural Division
結構分部

1. Background

Deterioration of marine infrastructure due to steel corrosion has become a major global challenge, while another major challenge for marine infrastructure is the shortage of fresh water and river sand for making concrete. To address both challenges, a novel type of concrete structures enabled by the use of durable fibre-reinforced polymer (FRP) composites and seawater sea-sand concrete (i.e. FRP-SSC Structures) was first proposed by Prof. Jin-Guang Teng in 2011, and has since kindled growing research interests among researchers worldwide.

The Workshop series on FRP-SSC Structures was initiated against this background and has now become an annual event. The First Workshop of the series was held in December 2016 at The Hong Kong Polytechnic University (PolyU), Hong Kong, China. The Second FRP-SSC Workshop was subsequently held at PolyU in 2018, together with the launching ceremony of a major multi-disciplinary project funded by the Theme-based Research Scheme (TRS) of the Hong Kong Research Grants Council. The major project aims to develop FRP-SSC Structures for marine infrastructure with a total budget of over HK\$52 million. The Third FRP-SSC Workshop, jointly organised by PolyU and the Southern University of Science and Technology (SUSTech), was held in January 2020 at the SUSTech campus, Shenzhen, China. The Fourth FRP-SSC Workshop held online in January 2021 hosted over 30 speakers from Hong Kong, Macau, the Chinese Mainland, Japan, Europe, North America, Australia, and the Middle East and over 700 attendees. The Fifth FRP-SSC Workshop held online in January 2022 included an industry forum and several research sessions and hosted over 700 attendees including over 150 from the relevant industries.

2. Organising Committee (in alphabetical order)

Advisory Chair:	Jin-Guang Teng
Chair:	Tao Yu
Members:	Jian-Guo Dai
	Christopher K.Y. Leung
	Zongjin Li
	Yi-Qing Ni
	Chi Sun Poon
	Florence Sanchez
	Tong Sun
	Sheng-Nian Wang
	Xiao Lin Zhao
	Limin Zhou
Secretary-General:	Renjie Mi
Secretariat:	Jiajie Cai
	Zeyu Gao
	Xinyun Li
	Kui Lin
	Yanran Meng
	Yifei Wang
	Pandeng Zheng

3. Workshop Programme

To enhance awareness of the emerging technology among the relevant industries, the Workshop will include an Industry Forum which will be held on the afternoon of 25 February 2023, with a focus on the practical applications of FRP in civil engineering structures. The Workshop will also include six Research Sessions, which will include invited talks on recent scientific progress and technological advances on FRP, SSC, and related topics. The Workshop programme is given below.

25 February 2023 (Saturday)	
All given times are in Hong Kong Time (UTC+8). Vancouver Time = UTC – 8; New York Time = UTC – 5; London Time = UTC – 0; Melbourne Time = UTC + 11; Central Standard Time (CST) = UTC – 6; Central European Time (CET) = UTC + 1.	
9:00 - 9:30	Registration
Opening Session	
9:30 - 9:40	Jin-Guang Teng & Tao Yu. <i>The Hong Kong Polytechnic University</i>
Research Session 1 Chair: Zongjin Li, <i>Macau University of Science and Technology</i>	
9:40 - 10:10	Laboratory and field durability studies of FRP rebars under load and environmental effects (Online) Brahim Benmokrane[#]. <i>University of Sherbrooke</i>
10:10 - 10:40	Climate change and innovations in concrete technology Surendra P. Shah[#]. <i>University of Texas at Arlington</i>
10:40 - 10:55	Tea Break
Research Session 2 Chair: Chi Sun Poon, <i>The Hong Kong Polytechnic University</i>	
10:55 - 11:25	Seawater sea-sand concrete (SSC) structures reinforced with basalt FRP composites (Online) Zhishen Wu^{1, #}, Xin Wang¹, Chang Su^{1, 2}, Zhiqiang Dong¹, and Gang Wu¹. ¹ <i>Southeast University</i> , ² <i>Zhengzhou University</i>
11:25 - 11:55	Chloride binding during early-age hydration of C₃A and C₃S Zongjin Li^{1, #}, Xing Ming², and Yunjian Li². ¹ <i>Macau University of Science and Technology</i> , ² <i>University of Macau</i>
11:55 - 12:25	Effects of seawater, sea sand, and industrial by-products in mechanical, durability and chloride binding characteristics of ultra-high-performance concrete Xiao Lin Zhao^{1, 2, #}, Shameer Saleh^{1, #}, Aziz Hasan Mahmood¹, and Ehab Hamed¹. ¹ <i>UNSW Sydney</i> , ² <i>The Hong Kong Polytechnic University</i>
Lunch	

[#] Speaker

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Industry Forum (Part A)

Chair: Ricky C P WONG, *Civil Engineering and Development Department*

14:00 - 14:20	Registration
14:20 - 14:55	FRP composites for new construction: some recent innovations Jin-Guang Teng[#] . <i>The Hong Kong Polytechnic University</i>
14:55 - 15:30	Fiber-reinforced polymer composites for infrastructure applications in USA Ruifeng Ray Liang[#] , and Hota Gangarao. <i>West Virginia University</i>
15:30 - 16:05	Fiber-polymer composites for infrastructure applications in Switzerland (Online) Thomas Keller[#] . <i>École Polytechnique Fédérale de Lausanne (EPFL)</i>
16:05 - 16:20	Tea Break
Industry Forum (Part B)	
Chair: SP Chin, <i>HKIE Structural Division</i>	
16:20 - 16:55	Use of FRP-concrete-steel hybrid double-skin tubular members for arch bridges Guang-Ming Chen[#] . <i>South China University of Technology</i>
16:55 - 17:30	Use of FRP for reinforced concrete structures: design and applications Tao Yu[#] . <i>The Hong Kong Polytechnic University</i>
Dinner	

[#] Speaker

26 February 2023 (Sunday)

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Research Session 3

Chair: Jian-Guo Dai, *The Hong Kong Polytechnic University*

8:30 - 9:00	Life-cycle perspective on the application of stainless steel and CFRP sheet to reinforced concrete structures in chloride-laden environments Dan M. Frangopol ¹ , and Mitsuyoshi Akiyama ^{2, #} . ¹ <i>Lehigh University</i> , ² <i>Waseda University</i>
9:00 - 9:30	Multiscale models for the tensile strength retention of GFRP rebar in moist and alkaline environments Christopher K.Y. Leung [#] , Peng Wang, and Linyuwen Ke. <i>The Hong Kong University of Science and Technology</i>
9:30 - 10:00	Size effect of durability of GFRP bars in simulated SSC pore solution Jian-Fei Chen ^{1, #} , Zhi-Hao Hao ^{1, 2} , and Jian-Guo Dai ² . ¹ <i>Southern University of Science and Technology</i> , ² <i>The Hong Kong Polytechnic University</i>
10:00 - 10:15	Tea Break

Research Session 4

Chair: Jian-Fei Chen, *Southern University of Science and Technology*

10:15 - 10:45	A FRP bar connector with shearing stress-enhanced locking capability Tianhui Lu ^{1, 2} , Tao Yu ² , Zhongqing Su ² , and Limin Zhou ^{1, #} . ¹ <i>Southern University of Science and Technology</i> , ² <i>The Hong Kong Polytechnic University</i>
10:45 - 11:15	Physicochemical-geochemical-mechanical simulation of seawater sea-sand concrete beams reinforced with FRP bars Keitai Iwama ¹ , Zhihao Hao ¹ , Zhao Wang ² , Mingfeng Kai ¹ , Jian-Guo Dai ^{1, #} , and Koichi Maekawa ² . ¹ <i>The Hong Kong Polytechnic University</i> , ² <i>Yokohama National University</i>
11:15 - 11:45	Novel FRP prestressed SSC concrete assembled floating structure like bamboo raft (Online) Peng Feng [#] , and Chongfeng Xie. <i>Tsinghua University</i>
11:45 - 12:15	Potential for sea water sea sand concrete in UK's offshore wind energy sectors Dilum Fernando [#] . <i>The University of Edinburgh</i>

Lunch

Research Session 5	
Chair: Dilum Fernando. <i>The University of Edinburgh</i>	
14:00 - 14:30	FRP-confined UHPC: Compressive behaviour (Online) Junjie Wang ¹ , Shishun Zhang ^{1, #} , Xuefei Nie ¹ , and Tao Yu ² . ¹ <i>Huazhong University of Science and Technology</i> , ² <i>The Hong Kong Polytechnic University</i>
14:30 - 15:00	Investigation of the long-term performance evolution of concretes in Yantian Port: A case study Zhihong Fan ^{1, #} , Shengnian Wang ² , Jianbo Xiong ¹ , Haiwei Zhu ^{1, #} , and Pingxiang Ding ¹ . ¹ <i>CCCC Fourth Harbor Engineering Institute Co., Ltd.</i> , ² <i>CCCC Fourth Harbor Engineering Co., Ltd.</i>
15:00 - 15:30	Seismic performance and numerical modelling of FRP-concrete-steel double-tube columns with shear studs Bing Zhang ^{1, #} , Shuhong Lin ¹ , Sumei Zhang ¹ , Xingbao Lu ² , and Tao Yu ³ . ¹ <i>Harbin Institute of Technology, Shenzhen</i> , ² <i>Nanjing Tech University</i> , ³ <i>The Hong Kong Polytechnic University</i>
15:30 - 16:00	Mg ions tailor fresh properties of seawater-based non-calcium geopolymers Shuaibin Wang, Shishun Zhang, and Xu Chen [#] . <i>Huazhong University of Science and Technology</i>
16:00 - 16:15	Tea Break
Research Session 6	
Chair: Bing Zhang. <i>Harbin Institute of Technology, Shenzhen</i>	
16:15 - 16:45	Novel photonics based sensors for assessing the structural health of buried sewer pumping stations (Online) Tong Sun ^{1, #} , Matthias Fabian ¹ , Richard Scott ¹ , Kenneth TV Grattan ¹ , Heriberto Bustamante ² , Michael Thurner ² , Raymond Llave ² , Mason Win ² , and Jeremy Hearfield ² . ¹ <i>City, University of London</i> , ² <i>Sydney Water, Parramatta</i>
16:45 - 17:05	Numerical simulation of seawater cement paste with an integrated physicochemical-geochemical platform with validation by experiment Zhao Wang ^{1, #} , Sarah Abduljabbar Yaseen ^{2, 3} , Keitai Iwama ³ , and Koichi Maekawa ¹ . ¹ <i>Yokohama National University</i> , ² <i>The Hong Kong University of Science and Technology</i> , ³ <i>The Hong Kong Polytechnic University</i>
17:05 - 17:25	Failure modes of flange and web cleats in beam-to-column connections for pultruded GFRP shapes Sivaganesh Selvaraj [#] , Tak-Ming Chan, and Ben Young. <i>The Hong Kong Polytechnic University</i>
17:25 - 17:45	Optimizing seawater ultra-high-performance concrete mixes by incorporating high volumes of waste glass powder Chi Sun Poon, Wing Lun Lam [#] , Yanjie Sun, and Yamei Cai. <i>The Hong Kong Polytechnic University</i>
17:45 - 18:05	Effect of temperature on the transport of sodium chloride solution in the calcium silicate hydrate gel: A molecular dynamic study Umar Hayat [#] , Mingfeng Kai, and Jian-Guo Dai. <i>The Hong Kong Polytechnic University</i>

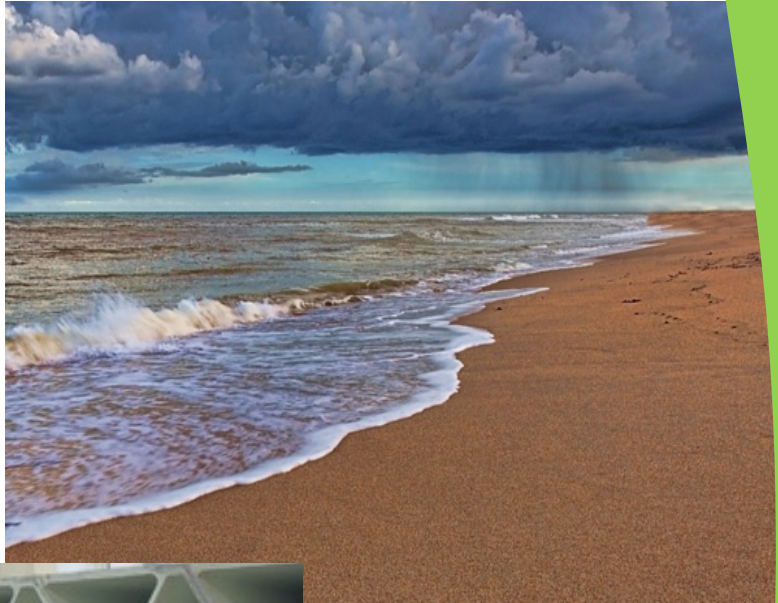
4. Proceedings

Proceedings of the Sixth International Workshop on Seawater Sea-Sand Concrete (SSC) Structures Reinforced with FRP Composites will be available at the website of the TRS project on FRP-SSC structures (<https://www.polyu.edu.hk/cee/frpscc>).

5. Time and Venue

The Sixth FRP-SSC Workshop will be held on 25-26 February 2023 in hybrid mode. The venue of the Workshop is the Senate Room M1603 of M block (Li Ka Shing Tower) of the PolyU campus, while a Zoom link will be sent to the online attendees before the Workshop by email.





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