# **Preface**

This proceeding contains the accepted papers from The 2012 International Conference on Civil, Architectural and Hydraulic Engineering (ICCAHE2012). The conference was held at the Zhangjiajie, China on 10–12 August 2012 and was organized by Changsha University of Science and Technology, Hunan University, Xiangtan University, Nanhua University, Hunan University of Science and Technology and Hunan City University. This conference is a forum for enhancing mutual understanding between scientists, engineers, policymakers and experts in the civil, architectural and hydraulic engineering field. The theme of this conference is "innovation in construction". This proceeding is enriched by contributions from many experts representing many industry and academic establishments worldwide. Authors from more than 30 different countries have pooled their rich multidisciplinary up-to-date knowledge, in order to share their invaluable experience with the community.

All papers published in this volume have been peer reviewed through processes administered by the proceedings editors. Reviews were conducted by expert referees to the professional and scientific standards. This book covers the subject areas of hydrology and water resources, irrigation and water conservancy, water supply and drainage engineering, flood and drought management, hydraulic engineering construction, hydropower, hydraulics and hydraulic machinery.

We would like to express our deep gratitude to all the keynote speakers, authors, referees, exhibitors, technical co-sponsoring organizations, committee members, and many others on whom the success of this prestigious event depends.

The editors

## Organized by:

Changsha University of Science and Technology, China

## Co-organized by:

Hunan University, China

Xiangtan University, China

Nanhua University, China

Hunan University of Science and Technology, China

Hunan City University, China

# **Conference Organization**

### Chairmen

Acadmician Prof. Qiwei Han, China Institute of Water Resources and Hydropower Research, China; Changsha University of Science and Technology, China

Academician. Prof. Kejian Ma, Guizhou University, China

### **International Scientific Committee**

Dr. Ahmed Sarhan, Malaya University, Malaysia

Dr. Gui Wang, The University of Queensland, Australia

Dr. Scott T. SMITH, Hong Kong University, Hong Kong

Dr. Sreenivasan M, SR Technical University, IN

Dr. Tianjian Ji, The University of Manchester, UK

Prof. Abdul Amir H. Kadhum, Malaysia

Prof. A. Kaveh, Iran University of Science & Technology, Iran

Prof. Aftab Mufti, University of Manitoba, Canada

Prof. Antoine E. Naaman, University of Michigan, USA

Prof. Ayman Mosallam, Univ of California Irvine, USA

Prof. B. H. V. Topping, Heriot-Watt University, Edinburgh, UK

Prof. Chao Hsun Haung, National Taipei University of Technology, Taiwan

Prof. Chiew Sing-Ping, Nanyang Technological University, Singapore,

Prof. Carlos Aquino, Ritsumeikan University, Japan

Prof. David Hui, University of New Orleans, USA

Prof. Hamid Ronagh, The University of Queensland, Australia

Prof. Han-Bin Ge, Meiju University, Japan

Prof. I. E. Harik, University of Kentucky, USA

Prof. J. H. Bungey, University of Liverpool, Liverpool, UK

Prof. Jian-Fei Chen, the University of Edinburgh, UK

Prof. Jongwook Park, Sungkyunkwan University, Korea,

Prof. Katsuyuki Kida, Kyushu University, JP

Prof. Ken-ichi Manabe, Tokyo Metropolitan University, Japan

Prof. Kum-Gil Sung, Inha University, Korea

Prof. Kyung-Man Moon, Korea Maritime University, Korea

Prof. K. J. Bathe, Massachusetts Institute of Technology, USA

Prof. Kang Seok Lee, Chonnam National University, South Korea

Prof. Lau Hieng Ho, Curtin University of Technology, Malaysia

Prof. Luciano Feo, University of Salerno, Italy

Prof. Lawrence C. Bank, University of Wisconsin-Madison, USA

Prof. Marcus M.K. Lee, the University of Southampton, UK

Prof. Mark G Stewart, The University of Newcastle, Australia

Prof. M. N. Soutsos, University of Liverpool, Liverpool, UK

Prof. Nangkula Utaberta, The National University of Malaysia

Prof. Ramiro Sofronie, University of Bucharest, Romania

Prof. R. Sri Ravindra rajah, University of Technology, Australia

Prof. Tim Ibell, University of Bath, UK

Prof. Tamon UEDA, Hokkaido University, Japan

Prof. TAN Kang-Hai, Nanyang Technological University, Singapore

Prof. Tan Kiang Hwee, National University of Singapore

Prof. Wen-Hsiang Hsieh, National Formosa University, Australia

Prof. Zhi-Shen Wu, Ibaraki University, Japan

Prof. Zong Woo Geem, iGlobal University, USA

Prof. Quanxi Shao, The Commonwealth Scientific and Industrial Research Organisation of Australia

Prof. Hansong Tang, The City University of New York, USA

Prof. Shixiong Hu, East Stroudsburg University of Pennsylvania, USA

Dr. Dar Hao Chen, Texas Department of Transportation, USA

Prof. Zhouhui YangUniversity of Alaska Anchorage, USA

Prof. Chunsheng Cai, Louisiana Statae University, USA

Prof. Qiusheng Li, City University of Hong Kong

Prof. Changbo Jiang, Changsha University of Science and Technology, China

Prof. Donghuang Yan, Changsha University of Science and Technology, China

Prof. Donglin Chen, Changsha University of Science and Technology, China

Prof. Yang Liu, Changsha University of Science and Technology, China

Prof. Zhaohui Liu, Changsha University of Science and Technology, China

Prof. Weiliang Jin, Zhejiang University, China

prof. Xianglin Gu, Tongji University, China

Prof. Chunyu Wei, Hunan University, China

Prof. Guoqiang Zhang, Hunan University, China

Prof. Yibin He, Hunan University, China

Prof. Ditao Niu, Xi'An Univ. of Architecture and Tech., China

Prof. Zhiwu Yu, Central South University, China

Prof. Baihao Li, Dongnan University, China

Prof. Shuguo Liang, Wuhan University, China

Prof. Shicheng Ma, Xiangtan University, China

Prof. Bowang Chen, Hunan City University, China

Prof. Xijun Liu, Hunan University of Science and Technology, China

Prof. Shuibo Xie, Nanhua University, China

Prof. Wanlin Cao, Beijing University of Technology, China

Prof. Chaohe Chen, South China University of Technology, China

Prof. Changyu Cui, Harbin Institute of Technology, China

Prof. Yaojun Ge, Tongji University, China

Prof. Linhai Hang, Tsinghua University, China

Prof. Yong Huang, Guizhou University, China

Prof. Guoqiang Li, Tongji University, China

Prof. Lijuan Li, Guangdong University of Technology, China

Prof. Aiqun Li, Southeast University, China

Prof. Guangfan Li, Hainan University, China

Prof. Weijun Yang, Changsha University of Science and Technology, China

Prof. Yan Xiao, Hunan University, China;

Prof. Feng Liu, Guangdong University of Technology, China

Prof. Shilang Xu, Zhejiang University, China

Prof. Shanhua Xu,Xi'An Univ. of Architecture and Tech., China

Prof. Lieping Ye, Tsinghua University, China

Prof. Jianguo Nie, Tsinghua University, China

Prof. Tiejun Zhao, Qingdao Technological University, China

Prof. Xingang Zhou, Yantai University, China

Prof. Jiru Zhang, Wuhan University of Technology, China

Prof. Chuangbin Zhou, Wuhan University, China

Prof. Xuejun Zhou, Shandong Jianzhu University, China

## **Local Organizing Committee**

#### Chair

Prof. Weijun Yang, Changsha University of Science and Technology, China

#### Co-Chair

Prof. Changbo Jiang, Changsha University of Science and Technology, China

#### Member

Prof. Bowang Chen, Hunan City University, China

Prof. Donglin Chen, Changsha University of Science and Technology, China

Prof. Shicheng Ma, Xiangtan, China

Prof. Xijun Liu, Hunan University of Science and Technology, China

Prof. Yang Liu, Changsha University of Science and Technology, China

Prof. Zhaohui Liu, Changsha University of Science and Technology, China

Prof. Shuibo Xie, Nanhua University, China

Prof. Guoqiang Zhang, Hunan University, China