

Preface

The International Conference on Structures and Building Materials (ICSBM) is the premier forum for the presentation of new advances and research results in the fields of civil engineering and materials. This conference series bring together international scientific community, academics and practitioners, researchers and students and provide an opportunity to discuss and share recent advances in both research and practice about all aspects of building materials and diagnostics of civil engineering, building, structures and geotechnics. After the very successful previous issues ICSBM'2011 (Guangzhou, China) and ICSBM'2012 (Hangzhou, China), the ICSBM'2013: 3rd International Conference on Structures and Building Materials was held successfully in Guiyang, China, from March 9 to 10, 2013.

This book is a collection of accepted papers. All these accepted papers were subjected to strict peer-reviewing by 2-4 expert referees. The book is divided into 18 chapters, including Geological and Geotechnical Engineering, Structural Engineering, Bridge Engineering, Tunnel, Subway and Underground Facilities, Road and Railway Engineering, Seismic Engineering, Computational Mechanics, Traditional Construction Materials, Advanced Construction Materials, Energy-Efficient Technologies in Buildings, Architectural Design and Its Theory, Architectural Environment and Ecological Environmental Protection etc. This book will not only provide the readers a broad overview of the latest advances but also provide the researchers a valuable summary and reference in this field.

We would like to express our sincere appreciations to all the authors for their contributions to this volume. We are indebted to all the referees for their constructive comments on the papers. Thanks are also given to Trans Tech Publications for producing this volume.

The Committee of ICSBM 2013

2013 International Conference on Structures and Building Materials
(ICSBM 2013)

Organized by:

Guizhou University, China

Conference Organization

Chairman

Prof. Weiliang Jin, Zhejiang University, China

Technical and Organizing Committee

Prof. Xiuli Du, Beijing University of Technology, China

Prof. Yong Huang, Guizhou University, China

Prof. Jianjun Zheng, Zhejiang University of Technology

Prof. Chaohe Chen, Hainan University, China

Prof. Weiliang Jin, Zhejiang University, China

Prof. Jianguo Nie, Tsinghua University, China

Prof. Bo Wu, South China University of Technology, China

Prof. Shilang Xu, Zhejiang University, China

Prof. Yiqiang Xiang, Zhejiang University, China

Prof. Jianjun Zheng, Zhejiang University of Technology

Prof. Boyang Ding, Zhejiang University of Technology

Prof. Minyun Hu, Zhejiang University of Technology

Prof. Zhiyong Dong, Zhejiang University of Technology

Prof. Xinjun Zhang, Zhejiang University of Technology

Prof. Fuying Liu, Zhejiang University of Technology

Academician Prof. Wei Sun, Southeast University, China

Prof. Ailin Zhang, Beijing University of Technology, China

Prof. Weiming Yan, Beijing University of Technology, China

Prof. Bin Xu, Hunan University, China
Prof. Feng Fan, Harbin Institute of Technology, China
Prof. Lijuan Li, Guangdong University of Technology
Prof. Yiqiang Xiang, Zhejiang University, China
Prof. Peiyu Yan, Tsinghua University, China
Prof. Feng Liu, Guangdong University of Technology
Prof. Jun Deng, Guangdong University of Technology
Prof. Jianxun Ma, Xi'an Jiaotong University, China
Prof. Jichao Zhang, Guangzhou University, China
Prof. Linhai Han, Tsinghua University, China
Prof. Wenguang Liu, Shanghai University, China
Prof. Yanpeng Zhu, Lanzhou University of Technology, China
Prof. Yun Zhou, Guangzhou University, China
Prof. Zhengliang Li, Chongqing University, China
Prof. Zhihua Chen, Tianjin University, China
Prof. Guangfan Li, Hainan University, China
Prof. Jiping Hao, Xi'AN Univ. of Architecture and Tech., China
Prof. Jihong Ye, Southeast University, China
Prof. Zixiong Guo, Hua Qiao University, China
Prof. Xuejun Zhou, Shandong Jianzhu University, China
Prof. Ayman Mosallam, Univ of California Irvine, USA
Prof. Aftab Mufti, University of Manitoba, Canada
Prof. Antoine E. Naaman, University of Michigan, USA
Prof. A. Kaveh, Iran University of Science & Technology, Iran
Prof. Aftab Mufti, University of Manitoba, Canada
Prof. B. H. V. Topping, Heriot-Watt University, Edinburgh, UK
Prof. David Hui, University of New Orleans, USA
Prof. Faris Albermani, University of Queensland, Australia
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-G. Teng, Hong Kong Polytechnic University, Hong Kong
Prof. J. H. Bungey, University of Liverpool, Liverpool, UK
Prof. Jian-Fei Chen, the University of Edinburgh, UK
Prof. Kang Seok Lee, Chonnam National University, South Korea
Prof. K. J. Bathe, Massachusetts Institute of Technology, USA
Prof. Lawrence C. Bank, University of Wisconsin-Madison, USA
Prof. Luciano Feo, University of Salerno, Italy
Prof. M. N. Soutsos, University of Liverpool, Liverpool, UK
Prof. Mark G Stewart, The University of Newcastle, Australia
Prof. Marcus M.K. Lee, the University of Southampton, UK
Prof. R. Sri Ravindra rajah, University of Technology, Australia
Prof. Ramiro Sofronie, University of Bucharest, Romania
Prof. Steve.G.Millard, University of Liverpool, UK
Dr.Tianjian Ji, The University of Manchester, UK
Prof. Tamon UEDA, Hokkaido University, Japan
Prof. Tan Kiang Hwee, National University of Singapore
Prof. Tim Ibell, University of Bath, UK
Prof. Zong Woo Geem, iGlobal University, USA
Prof. Zhi-Shen Wu, Ibaraki University, Japan

Local Organizing Committe

Chair

Prof. Yong Huang, Guizhou University, China

Member

Prof. Tai Bao, Guizhou University, China

Prof. Tao Xie, Guizhou University, China

Prof. Xianzhong Guo, Guizhou University, China