Preface

Special issue on Life-cycle Diagnosis and Prognosis of Civil Infrastructure

Maintenance and management of aging civil infrastructure systems, such as bridges, highway and railway transportation systems, has recently become a grand challenge for engineers. Research indicates that reliable and cost-effective techniques are in urgent need for the massive structural rehabilitation and repair investment. Without proper management of aging civil structures, the failure of these infrastructure systems could have a major economic impact. Structural damage diagnosis is a useful tool for in-service damage detection for structures concerned and is a key element of strategies for condition-based maintenance of aging civil infrastructure. However, the related and yet unsolved question is how to fully utilize the monitored information for assessment of structural safety. Damage prognosis, as a natural extension to damage detection problem, aims to estimate the evolution over time of detected damage and predicted condition, thus allowing the prediction of future performance of deteriorating structures.

The special issue on "Life-cycle Diagnosis and Prognosis of Civil Infrastructure" aims to reflect the advances and current challenges in damage diagnosis and prognosis of civil structures and to share the latest development in structural damage assessment methods and life-cycle performance assessment technologies. The scope of the special issue includes monitoring and assessment of structures, structural safety and reliability, vibration-based damage assessment, and case studies of life-cycle damage diagnosis and prognosis of civil structures.

This special issue includes a total of 6 peer-reviewed papers. In the paper “Modal parameters identification of heavy-haul railway RC bridges – experience acquired” by Regina Sampaio and Tommy H.T. Chan, the operational modal analysis of reinforced concrete bridges of a heavy haul single track railway is investigated. The paper “Delamination and concrete quality assessment of concrete bridge decks using a fully autonomous RABIT platform” by Nenad Gucunski, Seong-Hoon Kee, Hung La, Basily Basily and Ali Maher describes the development and implementation of the RABIT (Robotics Assisted Bridge Inspection Tool) for data collection using multiple non-destructive testing technologies. The paper “Impact of aggressive exposure conditions on sustainable durability, strength development and chloride diffusivity of high performance concrete” by S. Al-Bahar and A. Husain provides an evaluation of the influence of supplementary cementing materials on long-term performance of concrete under natural marine environment. In the paper “Time-dependent reliability analysis of coastal defences subjected to changing environments” by Hua-Peng Chen, a method for assessing the risk of wave run-up and overtopping of existing coastal defences and for analyzing the probability of failure of the structures under future hydraulic conditions is proposed. The paper “Impact effect analysis for hangers of half-through arch bridge by vehicle-bridge coupling” by Yuan Shao, Zong-guang Sun, Yi-fei Chen, Huan-Lan Li investigates vehicle impact effect on the hangers of a half-through concrete-filled-steel-tube arch bridge by the use of a vehicle-bridge coupling model. Finally, the paper “Refinement of damage identification capability of neural network techniques in application to a suspension bridge”

by J.Y. Wang and Y.Q. Ni provides a simulation study on the enhancement of damage identification capability by the auto-associative neural network technique and the probabilistic neural network technique in application to a suspension bridge.

As the Guest Editors of the special issue, we would like to express our sincere appreciation to the authors who contributed their work to this special issue and to the reviewers for their great efforts on shaping and improving this issue. The Guest Editors would also like to express our sincere gratitude to the Editors-in-Chief of the journal *Structural Monitoring and Maintenance*, Prof. Hong-Nan Li, Associate Editor, Prof. Ting-Hua Yi, and Managing Editor, Prof. Chang-Koon Choi, for their kind guidance and support leading to success of this special issue.

Guest Editors:

Prof. Yi-Qing Ni, Department of Civil and Environmental Engineering, The Hong Kong Polytechnic University, Hong Kong
Dr. Hua-Peng Chen, School of Engineering, University of Greenwich, UK
Dr. Xiao-Wei Ye, School of Civil Engineering, Zhejiang University, China
Dr. Hong-Hu Zhu, School of Earth Sciences and Engineering, Nanjing University, China