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# GUEST EDITORIAL

## Advances in life-cycle civil engineering

Civil engineering is currently facing a profound transition towards a life-cycle-oriented design paradigm integrating continuous advances in the fields of modelling, analysis, design, inspection, monitoring, maintenance and rehabilitation of structure and infrastructure systems under uncertainty. The International Association for Life-Cycle Civil Engineering (IALCCE) was founded in 2006 to support this transition and promote the study, research and applications in the assessment, prediction and optimal management of life-cycle performance, safety, reliability and risk of civil structures and infrastructures (http://www.ialcce.org). To achieve this purpose, it was decided to bring together the main advances in the field of life-cycle civil engineering and related topics at the First International Symposium on Life-Cycle Civil Engineering (IALCCE'08), held in Varenna, Lake Como, Italy, 10–14 June 2008 (http://www.ialcce08.org), and afterwards at the Second International Symposium on Life-Cycle Civil Engineering (IALCCE 2010), held in Taipei, Taiwan, 27–31 October, 2010 (http://www.ialcce2010.ntust.edu.tw).

IALCCE 2010 was organised on behalf of IALCCE under the auspices of Taiwan Building Technology Center of the National Taiwan University of Science and Technology. The interest of the international civil engineering community in this event has been confirmed by over 210 symposium participants. The extended versions of seven selected papers presented at IALCCE 2010 are published in this special issue of *Structure and Infrastructure Engineering*. These papers deal with emerging concepts and innovative applications in the field of life-cycle civil engineering and related topics. *Tang* examines the life-cycle cost of bridges and emphasises the importance of considering the cost to society to establish the actual value of a bridge. *Sarkisian* discusses criteria and procedures for the evaluation of carbon footprint and long-term environmental efficiency for the design of structures in seismic regions. *Akiyama and Frangopol* present a novel procedure to integrate the probabilistic hazard associated with airborne chlorides into life-cycle seismic reliability assessment of concrete bridge piers. *Biondini et al.* propose a general methodology for probabilistic assessment of lifetime seismic performance of concrete bridges exposed to corrosion under uncertainty. *Penka and Zilch* investigate the fatigue resistance at coupling joints of existing post-tensioned concrete bridges. *Del Grosso and Lanata* describe an experimental monitoring programme on prestressed concrete beams under real environmental conditions with application to damage identification. Finally, *Li and Gao* formulate the probability density evolution method in the context of life-cycle civil engineering for reliability analysis of structures under deterioration and rehabilitation or maintenance processes.

The Guest Editors hope that this special issue will provide a valuable source of information for researchers, students and practitioners interested in the life-cycle of civil structure and infrastructure systems.

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