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Climate change risks to civil infrastructure

This special issue contains a collection of papers of a mini-symposium organized within the framework of the 11th International Conference on Structural Safety and Reliability that was held in June 16-20, 2013 at Columbia University, New York, NY. The mini-symposium was organized in collaboration with Kazuyoshi Nishijima (Kyoto University, Japan) and Mark Stewart (The University of Newcastle, Australia). The seven papers presented in this special issue were selected from among 17 technical papers originally submitted to the mini-symposium.

Climate projections announce significant future climate changes. Since civil infrastructure has been designed against past climate conditions, climate change could also affect its serviceability and safety. Therefore, a comprehensive management of climate change risks should consider these new/extreme environmental conditions in order to reduce potential loss of life and assets.

This special issue presents different types of hazards/actions (floods, sea level rise, extreme wind events, and physical and chemical actions affecting structural durability) for various types of infrastructure (housing, dams, reinforced concrete structures, and energy and water supply networks). Taking into account that climate change consequences depend on design standards and exposure conditions of given locations, this special issue also includes applications to infrastructure located in several countries: Australia, France, Germany, Japan, South Africa and United Kingdom. These applications and studies cover the following topics:

- risk assessment of climate change effects on civil infrastructure,
- cost-effectiveness and economic viability of climate adaptation technology and engineering measures,
- simplified climate models for engineering purposes, and
- discussions on the needs for updating engineering standards and processes.

It is hoped that this special issue highlights some of the aspects to be considered on the development of a comprehensive framework of 'Climate Adaptation Engineering' to handle climate change risks in civil engineering. Climate Adaptation Engineering aims at identifying efficient and cost-effective engineering solutions for climate adaptation. This objective can be achieved by integrating climate change science and engineering and it should provide recommended changes in current engineering practices (design, construction, maintenance, retrofit, etc.) for climate adaptation.

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