Editorial

Thomas Ummenhofer Dr-Ing

Professor of Structural Engineering, Karlsruhe Institute of Technology, Steel and Lightweight Structures, Karlsruhe, Germany

This issue of *Structures and Buildings* contains a wide spread of civil engineering issues covered by five international papers on various technical topics. The papers originate from different research institutions across Asia, Australia and Europe. The presented results offer opportunities and diverse approaches for a wide range of engineering applications. The studies included herein make use of analytical modeling, numerical simulations and experimental testing. The presented work also comprises the formulation of specific finite elements. The outcome is of interest for structural applications in concrete, steel and composite as well as masonry.

The first paper by He *et al.* (2015) presents a neural-fuzzy control strategy for cable-stayed bridges subjected to seismic actions, by employing electromagnet-driven active mass damper systems. To be able to activate the damping systems in real time, a neuronal network combined with a fuzzy controller is used. The authors show, in simulations for a benchmark system representing a real bridge structure under seismic events, how intelligent control of cable-stayed bridge structures can mitigate their dynamic response by using the proposed system. It is shown that the dynamic effects of longer cables could not been appreciably reduced by the system. Therefore, it is suggested to combine the system with classical fluid dampers for long cables.

In the next paper, Choi *et al.* (2015) experimentally investigate the effect of amorphous metallic fibres (AMF) on free and drying shrinkage and restrained shrinkage, as well as cracking of concrete in dependence of the fibre volume fraction. A free drying shrinkage and two types of restrained drying shrinkage tests were carried out, to investigate the cracking behaviour of AMF-reinforced concrete. Based upon several experiments, the authors conclude that the addition of AMFs reduces the amount of drying shrinkage and delays the crack development time and crack width considerably. The latter can even be predicted with accurate precision by a proposed analytical model.

The third contribution by Lança *et al.* (2015) introduces a structural safety assessment and performance evaluation of the upper choir of the famous Santa Maria de Belém church in Lisbon, Portugal, in order to add a new 20 t organ. By refining and simplifying a finite-element model, the choir's masonry performance under self-weight and seismic actions is investigated. In their conclusion, the authors state that the safety factor of the masonry vault appears acceptable under the actions, also when adding the 20 t weight of the organ.

The authors of the fourth paper propose a yield line mechanism-based analytical model for steel circular hollow sections under pure bending to simulate its collapse deformation and to predict the energy absorption mechanism. The energy absorption capacity during failure is investigated and the proposed model is verified based on parametric studies and correlations with known experimental data. In accordance with the results, Maduliat *et al.* (2015) conclude that sections with a lower slenderness ratio leading to a smaller bending capacity but a comparatively higher energy absorption capacity.

The last contribution by Zhang *et al.* (2015) presents a finite element for the spatial free vibration analysis of horizontally curved thin-walled rectangular box beams. Nine identified cross-section deformation modes are used to formulate the contour mid-surface displacement field by generalised displacements as well as coordinates. To check the validity and the convergence behavior of the new element, the results of numerical examples were compared with Ansys shell element results.

REFERENCES

- Choi K, Truong G and Choi S (2015) Restrained shrinkage cracking of amorphous metallic fibre-reinforced concrete. *Proceedings of the Institution of Civil Engineers – Structures and Buildings* **168**(12): 902–914, <http://dx.doi.org/10.1680/stbu.14.00051>.
- He M, Hu R, Wang J, Chen L and Chen C (2015) Intelligent active control of a benchmark cable-stayed bridge. *Proceedings of the Institution of Civil Engineers – Structures and Buildings* **168**(12): 890–901, <http://dx.doi.org/10.1680/stbu.14.00038>.
- Lança P, Lourenço P and Ghiassi B (2015) Structural assessment of a masonry vault in Portugal. *Proceedings of the Institution of Civil Engineers – Structures and Buildings* **168**(12): 915–929, <http://dx.doi.org/10.1680/stbu.14.00093>.
- Maduliat S, Ngo T and Tran P (2015) Energy absorption of steel hollow tubes under bending. *Proceedings of the Institution of Civil Engineers – Structures and Buildings* **168**(12): 930–942, <http://dx.doi.org/10.1680/stbu.14.00109>.
- Zhang L, Zhu Z, Shen G and Cao G (2015) Free vibration of curved thin-walled rectangular beams. *Proceedings of the Institution of Civil Engineers – Structures and Buildings* **168**(12): 943–957, <http://dx.doi.org/10.1680/stbu.14.00112>.