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Editorial

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Editorial

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It is always a great pleasure when an editorial activity comes to fruition. The in-focus section on ‘Wind Energy Structures’ which opens this issue of *Structures and Buildings* is one of those cases. Motivated by the desire to provide the academic and professional audience of the journal with a much-needed state of the art in such an important field of scientific investigations and technical developments, this in-focus section comprises of five original research papers, all addressing different aspects concerning the analysis and design of wind turbine structures.

The first paper, contributed by Ma *et al.* (2019), consists of an historical investigation on the most common failure mechanisms in wind turbine towers. Unsurprisingly, a combination of extreme wind loading conditions and human errors was found to be the most common cause of collapses. The authors also argued that special attention should be paid to cyclic effects, as more than 1 billion of cycles may be experienced during the operational lifespan of wind energy converters.

In the second paper, Martinez-Vazquez *et al.* (2019) address the significance of multi-hazard scenarios when assessing the total risk due to wind and seismic actions. Specifically, the authors pointed out that assets exposed to both types of environmental hazard incur an increased risk in comparison to cases where only one hazard is considered. This is due, for instance, to situations in which a strong earthquake is followed by a series of aftershocks and high-speed wind events, that in turn can lead to the collapse of an already weakened structure. Interestingly, although plausible, this scenario is not considered in the current state of practice.

In the third paper, Stavridou *et al.* (2019) investigate numerically the use of lattice towers as possible alternative to tapered tubular towers for onshore wind power generators. In particular, the authors used the commercial software Abaqus and Mathematica for the finite element modelling and heuristic structural optimisation of steel lattice towers. In one of the case studies, the authors concluded that the supporting lattice tower could be up to 40% lighter than the corresponding

tubular structure, with a reduction of about 15% of the total construction cost.

The fourth contribution (Mohammadi *et al.*, 2019) studies the effects of mudline foundation stiffness and damping on the aeroelastic time-history and fatigue-life analysis for different offshore wind turbines. In particular, soil damping was found to have a strong influence on the dynamic performance of the case-study structure, meaning that ideally this parameter should be better understood and quantified.

In the fifth and final paper of the in-focus section, Gluhović *et al.* (2019) present the results of another numerical investigation, this time on the dynamic effects of small-scale wind turbines mounted on the roof of typical low-rise steel buildings. It is shown that the addition of the wind energy generator increases the amplitude of vibration just in the near surrounding zone, while its effects at lower floors is negligible.

Overall, the five papers of the in-focus section provide certain valuable food for thought to enhance the resilience and sustainability of the built environment in relation to wind energy generators, with clear opportunities for improving the structural performance and efficiency of the supporting structures onshore and offshore.

In addition to the in-focus section, this issue of the journal also includes two general papers and a book review. In particular, both general papers are devoted to interesting technical problems for steel structures. Saleem *et al.* (2019) present an optimisation procedure for pre-engineered steel frames, that is tailor-made load-bearing structures with tapered steel cross sections. The procedure determines optimum flange and web dimensions to reduce the overall frame weight in comparison to a conventional structure. Keykha (2019) presents the results of a computational campaign aimed at exploring the effects of carbon-fibre-reinforced polymer strengthening on the structural behaviour of square hollow section steel beams with an initial deficiency under combined axial and lateral load.

As always, comments and discussions on any of the papers are welcome (the procedure is detailed in the last page of each paper), as well as the submission of technical papers that advance theory and practice under the remit of the journal.

We would also like to draw the attention of the readers to the exciting suite of upcoming themed issues on ‘Research and Design for Structures under Extreme Loading Conditions’, ‘Structural Design for Fire Safety’, ‘The Role of Structural Timber in the Earthquake Protection of Masonry Buildings’ and ‘Structures Based on Smart and Multi-Functional Concrete Materials’. These themed issues are intended as useful collections of papers in some utmost interesting and challenging areas of current research.

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