Editorial

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Matthew Gilbert's editorial for the final 2013 issue of *Engineering and Computational Mechanics* (Volume 166 Issue EM4) reiterated the underlying philosophy of the journal to publish new work from across the full range of mechanics problems relevant to civil engineering research and practice. The present issue reinforces that philosophy with contributions from environmental fluid mechanics, blast effects on structures, seismic excitation of nuclear facility structures, radioactive waste disposal and theoretical analysis of composite beam elements.

Recent UK developments in the construction of the next generation of nuclear power stations and the decommissioning of their ageing progenitors have led to renewed research and practitioner interest in the civil engineering aspects of these developments. In the international context, however, significant additional research demands arise when the power stations are located in regions of significant seismic activity. The catastrophic consequences of the 2011 magnitude 9.0 Japanese earthquake, which threatened 11 operational reactors at four nuclear power plants in the region and caused a major accident at the Fukushima plant, provide graphic and terrible illustrations of the need for research investment in this topic. The paper by Nielsen (2014) is an example of a relevant contribution to this field. It deals with the application of the commercial software suite Abaqus to use seismic analysis to determine effects of soil–structure interaction (SSI) on the dynamic performance of nuclear facilities. New investigations of seismic applications will interest the SSI community – in particular, the efforts by Nielsen to develop absorbing boundary conditions that apply to such applications.

The paper by Vardon *et al.* (2014) tackles the important medium- and long-term safety consequences of the geotechnical burial of radioactive waste. The scenario investigated is the production of gas by anaerobic corrosion of the metallic waste containers and the consequences of this process for (a) the behaviour of the clay buffer medium surrounding these containers and (b) the satisfactory operation of the waste repository. The paper reports numerical simulation of the behaviour of a compacted clay buffer subject to gas generation and migration from corrosion under a range of realistic conditions. The work contributes significantly to the analysis of radioactive waste repositories, providing conceptual insight into the behaviour of gas migration through the compacted clay buffer material and identifying a range of migration mechanisms.

The paper by Byfield and Paramasivam (2014) on determining the minimum stand-off distance required to prevent column failures in reinforced concrete framed buildings subject to blast

forms an interesting link with the papers contained within the recent blast-themed issue of *Engineering and Computational Mechanics* (Volume 166 Issue EM3). In particular, its treatment of the scaled distance at which reinforced concrete columns begin to fail and the minimum stand-off distance for use in congested urban areas is related to the work reported by Wilkinson *et al.* (2013) on the use of scaled distance curves to calculate blast loads. Byfield and Paramasivam focus on methods to determine the safe scaled distance beyond which failure of the column occurs (that is, where the shear force due to the blast is greater than the shear strength or the induced moment is greater than the flexural strength of the element). Such an approach is shown to provide estimates for the minimum stand-off distance required to prevent progressive collapses of buildings, where such collapses are initiated by column failure.

Lu and Shao (2014) address a classical structural analysis problem and present a closed-form analytical solution for the deflection of composite beams, focusing on the interface slip deformation behaviour of both steel box girders and concrete plates. They propose web interface slip deformation analysis of the steel–concrete composite box girders and compare the results of their analytical solution method with the much-developed transformed section method. By deriving accurate analytical solutions for the deflection of composite steel–concrete box beams with elastic shear connection, the work provides a reference for the calculation of deformation and subsequent design of steel–concrete composite box girders.

The ecological health of water bodies in semi-enclosed oceanic embayments is determined to a large extent by the distribution of tracers and nutrients within them. In view of the important roles played in this distribution by many physical agencies (tidal forcing, river inflows, wind, complex bathymetry and topography, density stratification, the earth's rotation and so on), an understanding of the transport of such materials within (and in and out of) the embayment is very difficult to reach without sophisticated modelling (usually numerical modelling) and comprehensive field investigations. An example of the former approach is provided in the paper by Lee *et al.* (2014) that illustrates the progress that can be made in modelling numerically a 'real' hydrodynamically – and topographically – complex bay (Tampa Bay, Florida, USA) using a Lagrangian approach in which patches of tracers are tracked and their fate is determined.

An important role of any journal is to draw to the attention of its readers the most recent research-based monographs and design guides. This issue contains two book reviews, both of which raise

awareness of new advances and provide state-of-the-art summaries of topics that are central to structural mechanics and fluid mechanics respectively. The books cover topics that are central to the interests of *Engineering and Computational Mechanics*. The first is one of a pair of companion monographs dealing with reinforced concrete beams, columns and frames – only one is reviewed here (*Mechanics and Design* (Casandjian *et al.*, 2013)), although, as the authors acknowledge, the two are complementary and could have been presented together in one book. The reviewer contrasts the strongly mathematical and analytical approach of the authors with the traditional practical or code-oriented approach familiar to UK practitioners and researchers – a distinction drawn by the authors of the books. The other book reviewed here is a much-anticipated contribution to the specialised area of computational modelling of fluid flows, not least because of the best-selling success of an earlier book by one of the authors (Rodi, 1993), a world leader in turbulence modelling. The stress here is on the large-eddy simulation approach to turbulent flow modelling, an approach that has become widely used in recent years. The incorporation of contributions by other leading figures will increase the appeal of the book across all areas of environmental hydraulics. The timely and insightful reviews provided by Vollum (2014) and Borthwick (2014) provide valuable guidance to practitioners and researchers alike.

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