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Editorial

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There is a complementary contrast in the papers presented in this issue. While two of the papers weigh more on the engineering side, the other two dwell on the computational aspects, providing a true combination of engineering and computational mechanics.

The paper by Samani *et al.* (2013) addresses flood attenuation in a river valley through multi-rockfill dams considering different inflow scenarios. Equations have been developed for flood routing through successive reservoirs upstream of the dams including hydraulics of flow through and over rockfill dams. These equations are solved numerically by the finite-volume method. The computational model has been validated against laboratory experiments. Besides the stated application of flood control measures for a river valley, deployment of multi-rockfill dams may be explored to retain industrial wastes like ash from coal-fired thermal plants and hazardous tailings from ore-processing mills. The paper is expected to entice readers to find innovative uses of the present approach in many diverse applications.

The paper by Giannakopoulos *et al.* (2013) begins with a review of the available models to characterise smoke dispersion in case of a floor fire in a room. The review presents an overview of the chronological development of the subject starting with the filling box model of Baines and Turner (1969), based on a point source of floor fire leading to a jet impinging on the ceiling and consequent uniform build-up of a smoke layer below this ceiling, up until the recent work of Kaye and Hunt (2007) that accounts for the effects of room geometry (i.e. aspect ratio) and side walls on the dynamics of spread and descent of the ceiling jet. The authors then extend Kaye and Hunt's model to represent a more realistic finite area source of fire by a simple technique of shifting the fire origin to a virtual point below the floor based on the geometry of the jet. The paper presents a large number of case studies considering room aspect ratio variations, as well as room height variations, and compares the results of the three models in terms of time taken to fill half and one-third heights of room, including the effect of the size of finite area sources of fire. The study findings suggest for particular attention to be paid to the design of tall structures for fire safety, as the available safe egress time predicted from their model is considerably lower than those of the previous models.

There are two further relevant papers on the theme of smoke motion in case of a room fire in the December 2012 issue of the journal. One is by Rooney and Linden (2012), dealing with radial jet consequent to a plume impingement on a surface, and another, by Carlotti *et al.* (2012), providing comparison of experimental data and simulations on smoke motion. Together these papers provide comprehensive coverage of the subject of room fires and smoke movement.

Lian *et al.* (2013) have demonstrated the significance of the concept of isogeometric analysis (IGA) to perform stress analysis of complex structural geometry by boundary-element method (BEM), using computer-aided design (CAD) geometry directly without need for further discretisation. The concept of IGA was introduced to finite-element method (FEM) of analysis. However, it requires additional work over CAD-produced surface geometry to represent the entire domain, as required in FEM analysis. IGA has a distinct advantage in BEM because of its inherent feature of reduced dimensionality of the problem that requires discretisation of boundaries only. The paper elaborates on the use of IGABEM through the detailed working of examples. The results are shown to be superior to conventional BEM because of the more accurate representation of the geometry, since IGA uses same shape functions that are used in CAD to represent geometry as well as field variables. Thus, readers can find in this paper a numerical tool for efficient early-stage design work experimentation without getting into the complexities of mesh generation.

Su and Wei (2013) have proposed models for computing deformations in roller compacted concrete (RCC) dams incorporating the effects of a weak interfacial layer between consecutive construction layers, as well as variation of modulus and density within a construction layer. Exponential variation is assumed for the intra-layer modulus and density according to the mechanics of composite materials. Rigidities of different layers, including the weak interfacial layers, are considered to act in series and in parallel to predict vertical and lateral deformations respectively. Formulations for rigidity include material behaviour in elastic, viscoelastic, viscoplastic and plastic regimes. Results have been compared with other available methods of prediction. There is another study also dealing with dam–reservoir heat exchange during the construction stage of layered RCC dams, reported in an earlier issue of the journal by Bayagoob *et al.* (2010). Readers may also explore the application of these approaches to other layered composite constructions.

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