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# Editorial

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It is my pleasure to welcome you to the June issue of *Water Management*, which brings together a selection of papers, briefings and discussions on a diverse range of interesting topics. The two briefing papers in this issue cover gradually varied flow in circular channels (Vatankhah and Easa, 2014) and the weather generator rainfall analysis processing tool Wrapt (Tomlinson *et al.*, 2014). The subsequent four papers focus on complex flow dynamics generated in stilling basins by submerged jets (Zhang *et al.*, 2014) and at reservoir intakes by free surface vortices (Sarkardeh *et al.*, 2014); sanitation issues associated with portable sewage systems (Khan *et al.*, 2014b); and water quality modelling in clean water distribution networks (Seyoum and Tanyimboh, 2014).

The accurate determination of water surface profiles for gradually varied flow (GVF) is a classic hydraulic problem of significant importance to water engineers interested in determining the upstream and downstream influence of in-stream structures or works. In their briefing paper, Vatankhah and Easa (2014) present an exact analytical solution to the simplified GVF equation for circular open channels. Their proposed method is applied to a simple numerical example to demonstrate its improved accuracy in predicting the overall length of affected backwater water surface profiles compared to existing approximate analytical and numerical methods, which underestimate this length by more than 20%. The authors state that their exact GVF solution eliminates the need for these more approximate methods and should provide a useful and simple tool for water engineering practitioners and researchers.

In the second briefing paper, Tomlinson *et al.* (2014) describe the software tool Wrapt (weather generator rainfall analysis processing tool), created as part of a UK Water Industry Research project to provide guidance on incorporating the impacts of climate change in sewer network modelling. The tool provides the industry with a means of using outputs of climate change projections for the UK (UKCP09) without the requirement for extensive knowledge of climate modelling. The authors discuss how Wrapt can be used to assess changes in extremes of short-duration rainfall events, in relation to sewer network performance and design, as well as its potential application to water quality modelling applications.

The paper by Zhang *et al.* (2014) presents a three-dimensional numerical modelling study of the complex flow fields generated by multi-horizontal submerged jets discharging into a stilling basin. This has been proposed as a new type of energy dissipater for hydropower stations with high water heads and large unit discharges. Numerical results are presented for the three typical operating conditions comprising of crest overflow discharges only, mid-orifice discharges only and combined crest overflow and mid-orifice discharges. Results indicate that stable vortices with horizontal axes are generated for the discharges through either the crest or mid-level orifices, while vertical axes vortices generated under the main jets are shown to reach the bed of the stilling basin. The authors conclude, however, that the range and intensity of these vortices are sufficiently small and weak not to pose a significant risk of abrasion damage and cavitation scour in the stilling basin.

Adequate sanitation, together with good hygiene and safe water, is fundamental to good health and socio-economic development. Natural disasters and armed conflicts can have catastrophic effects on clean water and sewage waste disposal infrastructure, especially in developing countries already short of these facilities. In the paper by Khan *et al.* (2014b), the performance of aerated-sludge portable sewage systems suitable for rapid deployment during such emergencies is explored with respect to the effects of dissolved oxygen (DO) concentrations and idle time due to power cut-off. Results from this study indicate that optimal system performance, in terms of sewage biodegradation, is achieved for DO levels around 6 mg/l, while idle times are required to be kept shorter than 48 h to prevent very low biodegradation efficiency or overall system failure.

In terms of clean water distribution networks (WDNs), water quality models are routinely used by utilities companies for network design and operational management purposes. Conventional water quality models used for this purpose, however, do not take account of the effects of network pressure deficiencies on water ageing and the deterioration of water quality in WDNs. In the paper by Seyoum and Tanyimboh (2014), a new integrated pressure-dependent hydraulic and water quality model is presented and assessed for two water supply zones in the UK. Although the model results indicate that water quality deterioration does occur under subnormal pressure conditions, the authors point to predicted variations in the spatial and temporal distributions of water age as possibly providing misleading results, and thus suggest the need for further research in this area.

In the final paper of the issue, Sarkardeh *et al.* (2014) present results from a scaled experimental study of velocity fields generated adjacent to a horizontal reservoir intake in the presence of a surface, air-core vortex. Such vortices are known to result in operational problems for hydropower schemes including system

vibrations, decreased turbine efficiency, debris entrainment and trash screen blockage at the intake, and reduced turbine longevity. Detailed flow velocity measurements from the study show the formation of downward and upward conical flow patterns from the water surface and reservoir bed, respectively, which contract towards the intake. The authors suggest that this scaled-model study could assist both researchers and engineers in understanding the complex flow patterns generated within reservoirs in the presence of air-core vortices.

The issue closes with two interesting discussions on estimation of the Muskingum parameter for flood routing models (Orouji *et al.*, 2014) and bridge pier scour prediction by gene expression programming (Khan *et al.*, 2014a). Orouji *et al.* (2013) used two meta-heuristic algorithms to calibrate the parameters of a non-linear Muskingum model. In the discussion contribution, the range of applicable flood routing models is extended to include semi-distributed models such as Muskingum–Cunge procedures, while the appropriate use of linear or nonlinear models for different river reaches is discussed. The paper by Khan *et al.* (2012) proposed a predictive equation for maximum scour depths at cylindrical and flow-aligned rectangular bridge piers. The discussion contribution in this issue focuses on the appropriateness of the primary variable calculated by the authors' scour model, the observed variability in its predictive capabilities and its sensitivity to the Froude number.

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