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Editorial

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Water Management continues to provide wide-ranging material aimed at attracting and informing a broad readership comprising both practitioners and academics. The increase in the number of papers published annually is testament to the popularity of the journal and the value with which it is held by the water engineering community. The diversity in readership is reflected in the range of papers published in any one issue. This is a key strength of the journal as it has the capability of raising awareness in all water-related disciplines. This issue of *Water Management* is no exception, with two papers on decision-making processes in water resources management, one on water quality issues and two theoretical analyses of open channel flow with clear applications to channel design, analysis and operation. However, there is a common thread linking each of these papers; modelling.

Understanding the hydraulic behaviour of systems – whether these are rivers, large-scale resource schemes or individual process units at water and wastewater treatment works – is a necessity for process scientists and engineers. Modelling represents the combination of traditional approaches to the solution of fluid flow problems (i.e. theory and experimentation) and can offer the scientist and engineer the information needed to design, analyse and optimise systems and processes. Consequently, the development of dynamic simulation software for water engineering processes which has taken place over the last 30 years, in parallel with significant improvements in computing power, has allowed the community to benefit from greater insight into the natural and engineered processes with which we all work. Correctly performed, computational modelling complements physical modelling, not least because it removes subjectivities in the interpretation of results. Simulation reduces our dependence on both expensive model tests and also the risk in investigating novel designs and technologies. Further advantages include the ability to examine the behaviour of systems at the limit of, or beyond design capacity; the ability to study large systems where controlled experiments at full-scale would be impossible to perform; and reduced lead-in times and costs for new designs.

Today commercially available packages are available to simulate steady-state, time-dependent, laminar or turbulent flows, multiple phases (e.g. solid, liquid and gas), as well as concurrent transport processes such as heat transfer, mass transfer or chemical reaction which interact with the flow.

Obviously, increasing complexity of operation, coupled with ever-increasing ease of use via sophisticated graphical user interfaces, reinforces the need for an international cohort of simulation experts. An expert system in the hands of an inexpert user is of no value, and the need for universities and industry to provide training in the underpinning science and modelling techniques is clear.

As the papers in this issue of the journal demonstrate, the need remains for the water community to develop and enhance our existing knowledge and simulation of systems, so that our management of water systems at all scales can be improved for the benefit of all. Brown *et al.* (2010) open the issue with a straightforward yet robust and novel approach to the simulation of disinfection by-product modelling in water treatment works and the distributions systems which they serve. In a period of intense regulatory scrutiny, water companies must operate to extremely tight performance standards enforced by quality regulators; generate financial efficiencies in order to satisfy the expectations of key stakeholders, such as shareholders and city analysts; and also satisfy economic regulatory requirements. This paper offers a cost-effective way of identifying supply systems at risk of compliance failure, allowing timely operator intervention.

The papers of Tang *et al.* (2010) and Razavi *et al.* (2010) both examine systems at a larger scale than Brown *et al.* (2010) and move to more complex forms of simulation. Tang *et al.* (2010) develop an artificial intelligence system to simulate a complex system of channels in Shanghai, modelling flow responses to operator interventions in order to manage the water resource system. Combining a detailed historical record of sluice gate operations with an artificial neural network gate operation model and a hydrodynamic model of the system, Tang *et al.* (2010) develop a series of sluice gate operations based on water levels and flow conditions, providing local water engineers with information on water movements in rivers and drainage.

Razavi *et al.* (2010) also present a decision-support system, again targeted at effective water resource management. The paper discusses how best to rank a series of water transfer projects in the Karun water basin in Iran. The authors successfully adopt various multi-attribute decision-making methods to assess the relative performance of ten inter-basin

transfer projects against eight broad criteria, including cost benefit ratio, regulatory compliance, stakeholder conflict and environmental effects. It is interesting to note the reliance on expert judgement to inform the model input procedure, reinforcing the need for informed human intervention to complement the computational work.

In his paper, Mitchell (2010) considers a theoretical analysis of open channel flow. In particular, the author develops a straightforward algorithm for calculating surge wave velocity and flow depth ratio in trapezoidal channels, which can be incorporated within a spreadsheet or simple simulation package. Whilst theoretical in nature, this paper offers a simple tool which practitioners can employ to consider a range of design scenarios, thus demonstrating the value which an academic approach can yield in practice.

This issue of the journal closes with another assessment relating to open channel flow, this time from Vatankhah and Bijankhan (2010). The authors provide a discussion on the choke phenomenon and offer a theoretical solution for choke-free flow in two different channel sections. Using a graphical output, the authors suggest that operational procedures can be defined to ensure choke-free conditions when bed elevation is changed.

I hope that, like me, you find this issue of *Water Management*

interesting and informative and I encourage you to continue to support the journal.

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