Editorial

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The papers published in this issue involve several key areas of the journal, including: the traditional areas of applied fluid dynamics (paper by Yang¹) and water and river engineering (papers by Ghosh *et al*² and by Mohyeddin Bateni and Yazdandoost³), catchments management (paper by Kjeldsen⁴) and groundwater (paper by Blake⁵).

The study presented in the paper by Malay Kanti Ghosh, Gunjan Kumar and Dhrubajyoti Sento looks at local scour characteristics downstream of a typical river diversion barrage. Details are given of a series physical model experiments undertaken to investigate the relationships between the maximum erosion depth and its location and several hydraulic parameters. Artificial neural networks (ANN) are used to assist in establishing these relationships. A three-dimensional computational fluid dynamics (CFD) model is also used to predict the water surface levels and bed scour profiles for both free surface and submerged flows. It is found that the maximum local scour depth may be predicted with a suitable CFD software package using appropriate physical and hydraulic parameters.

In the paper by James Blake a physically based distributed finite-element (FE) code is used to investigate the effects of antecedent hydrology on soakage testing. Several new numerical techniques in subsurface hydrological modelling are employed in this model. Different combinations of initial water table position and unsaturated zone soil moisture are considered for typical soils in order to evaluate modelled values of the infiltration coefficient and hence its sensitivity to antecedent hydrology. The results show that the antecedent water table position has a significant effect on the infiltration coefficient, while for a properly conducted test the seasonal antecedent soil moisture is less important. Suggestions are also made on soakage testing procedures to reduce uncertainties.

While the effect of urbanisation on storm runoff has long been conceptually understood, there have been few attempts to generalise these effects for use in rainfall-runoff modelling in ungauged catchments. The aim of study presented by Thomas Kjeldsen is to assess the performance of a relatively simple and intuitive extension to a lumped conceptual event-based rainfall-runoff model when applied to an urbanised catchment. It is assumed that the total volume of direct runoff originates

separately from the rural and urban parts of the catchment. Each part is associated with a specific percentage runoff value. The revised model was been applied to two catchments, with model performance being carefully assessed.

The paper by Shu-Qing Yang investigates conditionally averaged turbulent structures for vertical (upward and downward) motions in a 2D uniform flow. The connection between the wake law and up and down events is also discussed. Existing experiments have revealed that, in these two events, the conditionally averaged Reynolds shear stress, turbulent intensities and streamwise velocities are different. An attempt is made in this study by deriving the conditionally averaged momentum equation and using it to explain the difference.

The final paper, by Mohyeddin Bateni and Farhad Yazdandoost, investigates two types of hydraulic jumps involving adverse bed slopes. Type one takes place on a single negative (adverse) slope and type two starts with a positive slope and ends with a negative slope. Detailed physical model experiments were undertaken for both these two types of hydraulic jumps. Based on experimental observations, semi-empirical methods have been proposed to predict the key hydraulic jump parameters.

REFERENCES

1. Yang S.-Q. Influence of sediment and secondary currents on velocity. *Proceedings of the institution of civil engineering. Water Management*. 2009, 162, No. 5, 299–307
2. Ghosh M. K., Kumar G. and Sen D. Local scour characteristics downstream of diversion barrages. *Proceedings of the institution of civil engineering. Water Management*. 2009, 162, No. 5, 309–319
3. Mohyeddin Bateni S. and Yazdandoost F. Hydraulics of B-F and F jumps in adverse-slope stilling basins. *Proceedings of the institution of civil engineering. Water Management*. 2009, 162, No. 5, 321–327
4. Kjeldsen T. R. Modelling the impact of urbanisation on flood runoff volume. *Proceedings of the institution of civil engineering. Water Management*. 2009, 162, No. 5, 329–336
5. J. R. Blake. Soakage testing: modelling the effect of antecedent hydrology. *Proceedings of the institution of civil engineering. Water Management*. 2009, 162, No. 5, 337–346