Editorial

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As 2017 begins, it is clear that whatever policy direction world leaders take with regard to infrastructure and investment, there is more uncertainty around these areas than there appeared to be this time last year. With unanswered questions following the Brexit vote and its aftermath – not to mention the imminent change in administration in the USA – it is more important than ever that engineers, practitioners and researchers work together to continue to assess the impacts of new technologies and what they mean for the way civil engineers go about their business. The spirit of inquiry, systematic research and peer review as enshrined in the processes followed by all of the ICE Proceedings journals ensures that we are well placed to test any new technologies that are proposed and to maximise the benefits to designers and contractors. The present issue contains a further set of peer-reviewed articles that draw on a range of theories and cover a range of topics.

It is a testament to the enduring importance and attractiveness of open channel flows and their measurements that of the four papers contained in this issue are directly related to open channel flows and developing the work laid out in the standard texts on this issue such as Chow (1959) and French (1985). Indeed, at the time these works were written it was well understood that the theory contained in them would develop as better measurement techniques became available and as the demands for leaner and more ambitious designs grew. It also goes to show that the problems we research in this branch of civil engineering are not usually ‘new’ in the sense that, for example, we still need to construct bridges and other river crossings, which generally affect open channel flow and cause changes in flow regime. In all four papers the authors acknowledge this explicitly and also make use of experimental results to support their findings.

There is no doubting the value of studies like that of Deshpande and Kumar (2017), which make use of large flume facilities – in India in this case – to investigate the behaviour of sediments in open channels. Here, as in all four papers, the authors collected results in a large-scale experimental facility over long periods of time – it must also be recognised that good quality data sets only become available when researchers have had access to a particular resource or piece of equipment over a long period. The problem in this case is complex: what happens to a channel cross-section when seepage is taken into account alongside a streamwise flow regime, and the authors show that traditional models put forward by others must be adapted to account for the amount of bed seepage,

which may be considerable in some real-world cases (the paper contains a startling statistic that up to 45% of the flow may be lost in some cases to seepage). It is really only when we use large-scale physical models in a controlled environment such as a hydraulic laboratory that the full extent of the research questions becomes obvious. This contribution clearly has implications for designers of channels for irrigation and water supply where natural earth channels may be the most feasible option. The essential physics behind the behaviour of the flow should be of interest to all practitioners and researchers.

In the case of the article by Mohammadpour *et al.* (2017), experiments on scour around simple and compound bridge abutments were carried out in a similar large-scale facility, this time in Malaysia, a country in which the importance of addressing the problem of undermining of bridge abutments under high flows is clear. Again there is no doubting the importance of undertaking such investigations using this sort of methodology. The attractiveness of this paper lies in the authors’ articulation of the ways in which they have developed the work of Melville (1992) to produce a more comprehensive set of results using more up-to-date measuring technology than was possible in the early 1990s. Designers of bridge abutments will find great help in some of the results presented in this article, particularly concerning the coefficients C and β and their dependence on the geometry and properties of the case concerned, among other factors. A helpful procedure to compute scour depth using empirical methods is given in light of the findings made, together with some discussion of the reasons behind the differences between observed and modelled values.

For the specific problem of flow transition between supercritical and subcritical flow in an open channel, the majority of civil engineers would at some point during their training at least have seen a hydraulic jump, but relatively few will be aware of the problem of how to quantify the transition between flows of different Froude numbers where there is no jump. This problem is tackled in detail by Kabiri-Samani and Naderi (2017), who used a set of experiments under carefully controlled conditions in which they adopted a transitional structure to force a change in flow regime, taking vorticity, angular momentum and shear stress into account. Again there is a reliance here on both advanced computational techniques to analyse the data and on state-of-the-art sensors (acoustic Doppler velocimeters and pressure transducers) to produce accurate results. The authors themselves make the point that

such transitions are not that common, with traditional hydraulic jumps being more usual in flow transitions of this kind, but that there may be instances where this sort of controlled transition may be desirable.

The fourth paper in the issue is by Escameia *et al.* (2017), who address the practical matter of scour protection on a channel bed for various different flow scenarios involving obstacles. Here again, there is no doubting the practical application of this work, where different engineering works might affect the flow in a wide channel, which under certain conditions could lead to scour. Using flexible bed sills with riprap and carrying out experiments in a large facility at HR Wallingford in the UK, they were able to answer some important questions about the applicability of a number of approaches to design such measures against failure and investigate the mechanisms involved. This work has real practical applications, enabling designers in future to consider a wider set of alternatives to more conventional rigid sill approaches.

In conclusion, if there is one overarching message from these highly interesting articles, it is that there is no substitute for properly designed, good quality laboratory studies, reinforced by detailed analysis building on peer-reviewed work carried out by others – hardly a surprising view, but it is a message

worth repeating. On behalf of the Editorial Advisory Panel of *Water Management*, may I wish all readers a happy and prosperous New Year.

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