Editorial: Modelling Hydrodynamics for Water Resources

Modelling Hydrodynamics for Water Resources brings the opportunity to share experimental and modelling techniques related to water resources. The present special issue of *Journal of Hydroinformatics* contains selected papers presented during the international workshop held at University of Zaragoza in Spain (MODWATER 2019, 17–20 June 2019). Emphasis is stated on the mathematical models used to describe the overland and sub-surface flows, on the techniques used to characterize them experimentally and on the computational techniques used to develop numerical simulations. The papers are problem-oriented, rigorously introduced to different aspects of computational hydrodynamics and to different (well-established and emerging) measurement and simulation techniques. A great effort has been devoted to present the application of these techniques to typical problems in the field of water resources. Case studies will be presented covering a wide spectrum of applications in the fields of civil engineering, environment and agriculture.

Many water resources problems involve the study of steady and transient free surface flows described by the Shallow Water Equations which need suitable discretization techniques to preserve equilibrium solutions. In this issue the design of a novel numerical scheme in the framework of Discontinuous Galerkin methods can be found. Sometimes, in hydrological scales, such simulations still entail prohibitive computational costs on a uniform mesh which grows to improve resolution or accelerate the computations driven by the improvement of central processing unit processors, and, in particular, the use of graphics processing units (GPUs). An alternative to gain computational cost in river flooding is coupled 1D2D models together that may be combined with high-performance computing.

Not only is numerical techniques development important but also new approaches to solve water resources problems such as: culverts modelling to improve flood footprints and discharge peak estimation in risk evaluation plans; hydro-sedimentary models to represent the hydrodynamics and morphological processes during a flood event; two-layer shallow flow models to represent variable density in a fluid as a result of a bulk density driven by the mixture of different constituents; implementation of water quality models integrated in a 2D shallow water flow solver; interactions between flooding and pedestrians which give more realistic model responses of evacuees during floodwater flow or floating bodies transport in open channel flows.

Finally, numerical development must be validated and experimental data are essential. In all of the papers experimental data and exact solutions are used to support the validity of the numerical work and a novel dataset concerning flume experiments to analyse the transport of singular and grouped rigid bodies floating on water surface is provided.

Journal of Hydroinformatics has played an important role in disseminating these new developments to the User Community comprising Scientists and Professional Engineers tasked with implementing and applying hydroinformatic concepts.

The papers included in this special issue of *Journal of Hydroinformatics* are selected from the workshop contributions, providing a state-of-the-art overview as well as emergent directions for future developments. The guest editors would like to encourage scientists to share this valuable advance in knowledge and experimental work to continue advancing in the improvement of techniques, models and computing. They hope that all of the papers really wake up the readers' interest as well as they enjoyed and learned in the international workshop MODWATER 2019.

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