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NUMERICAL METHODS AND APPLICATIONS IN COASTAL ENVIRONMENTS

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PAOLA BACIGALUPPI*, MARIA KAZOLEA† AND JAMES T. KIRBY‡

* Laboratory of Hydraulics, Hydrology and Glaciology, ETH Zurich
Hönggerbergring 26 - 8093 Zurich, Switzerland
bacigaluppi@vaw.baug.ethz.ch

† Inria Bordeaux Sud-Ouest research center, Cardamom team
200 av. de la vieille Tour - 33405 Talence Cedex, France
maria.kazolea@inria.fr

‡Center for Applied Coastal Research, Department of Civil and Environmental Engineering
University of Delaware, Newark, DE 19716 USA
kirby@udel.edu

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ABSTRACT

Over 1.6 million kilometers of coastlines occur on the earth's surface. These areas are subject to hazards created by a range of natural events, such as earthquakes and hurricanes, which are a source for large waves and have a negative economic and social impact on the affected areas. In recent decades, mathematical and numerical modelling of free surface flows in realistic coastal environments represents an active research field and has led to the capability for performing accurate simulations of nonlinear and dispersive water waves. For large scale events, these simulations represent a necessary adjunct to laboratory experiments. They have also become an essential complement to experimental investigations at small scales, due to their potential of providing a more complete description of the underlying physics. Significant research effort has been put into advancing understanding of important processes of wave propagation, shoaling, diffraction, refraction, wave breaking and run-up over the shoreline; see for example [1,2] and references therein. These advances improve our ability to understand and predict impacts on coastal structures and urban areas. In this framework, a review of some of the most relevant modelling approaches and numerical discretization techniques can be found in [3].
In this light, the mini-symposium is intended to collect multidisciplinary contributions that encompass the most recent progress in the context of wave generation, propagation and run-up as well as in sheared flows along with the wave breaking. We will focus on: i) mathematical models; ii) specific numerical methods to tackle approximation difficulties; iii) applications.

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