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POTENTIAL-FLOW AND VISCOUS-FLOW SIMULATIONS OF INTERFACIAL FLOWS, WAVES AND FREE-SURFACE TURBULENCE

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ABSTRACT

Free-surface flows, in which freely movable two-fluid interfaces are involved in irrotational or rotational fluid motions, are ubiquitous in many important applications. Examples include industrial processes with multi-fluids, wind-wave-ocean interactions, and ship hydrodynamics. With the increase in computing power, numerical simulation has become an indispensible tool for the study of free-surface flows. In the past several decades, substantial progresses have been made in the computation methods (see e.g. the reviews in [1] and [2]), which in turn greatly improve our understanding of the flow physics (e.g. the nonlinear wave dynamics [3]). Nevertheless, due to the inherent difficulty of the problem, namely the location information of the surface is needed for the simulation but is at the same time part of the unknowns to be obtained, the simulation of this type of flows remains an active research topic.

The scope of this minisymposium covers both potential-flow theory based simulations and viscous/turbulent flow simulations. Novel numerical techniques for deformable surfaces, advanced modeling approaches for interfacial phenomena, and new insights to the flow physics obtained from simulations are all among the topics of interest. The objective of this minisymposium is to bring together researchers from different fields to foster their interaction and to promote the collaboration among numerical specialists and physical modelers.

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