NOVEL NUMERICAL METHODS FOR MODELLING COMPLICATED AND VIOLENT FLOWS

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Key words: Computational Marine Hydrodynamics, Violent Flows, Turbulent Flows, Overset Grid Techniques, Adaptive Refined Mesh Method, Cartesian Grid Method, Meshless Particle Method, Lattice Boltzmann Method, Machine Learning

ABSTRACT

Over past several years, many novel computational marine hydrodynamic methods, like overset grid techniques, adaptive refined mesh methods, Cartesian grid methods, meshless particle methods, high-order-spectral methods, Lattice Boltzmann methods, as well as machine learning, have been developed to deal with the problems of marine hydrodynamics, such as flows around surface ships, submarines, offshore wind turbines and floating platforms. The problems of such marine hydrodynamics are one of the most difficult topics in marine engineering because of the large span of spatial and temporal scales involved. Some of the important topics are marine vehicle resistance and propulsion, controllability, wave loads, wave induced motions, and energy and ecology considerations, including green water of ship motion in waves, self-propulsion of ship motion, LNG tank

sloshing, wave run-up and impact loads on floating platform with mooring system, VIV for risers and VIM for deep-sea platform, wake flows of offshore floating wind turbines, slamming, water entry/exit of bodies, both in model scale and full scale, etc. Correct understanding and application of hydrodynamics on marine vehicles and structures are vital in their design and operation. The aim of this Invited Session of Novel Computational Marine Hydrodynamic Methods for Complicated and Violent Flows is to provide a platform for disseminating recent advances made in novel computational marine hydrodynamic methods and explore outstanding and frontier problems in computational marine hydrodynamics for further research and applications.

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