X International Conference on Computational Methods in Marine Engineering, MARINE 2023
June 27-29, 2023, Madrid, Spain

NOVEL COMPUTATIONAL MARINE HYDRODYNAMIC METHODS FOR COMPLICATED AND VIOLENT FLOWS

DECHENG WAN[1],

ZHIGUO ZHANG[2], AMAN ZHANG[3], GUIYONG ZHANG[4], WEIWEN ZHAO[5]

[1]Computational Marine Hydrodynamics Lab (CMHL), Shanghai Jiao Tong University, Shanghai, China
E-mail: dcwan@sjtu.edu.cn

[2]Huazhong University of Science and Technology, Wuhan, China
E-mail: zzg@hust.edu.cn

[3]Harbin Engineering University, Harbin, China
E-mail: zhangaman@hrbeu.edu.cn

[4]Dalian University of Science and Technology, Dalian, China
E-mail: gyzhang@dlut.edu.cn

[5]Computational Marine Hydrodynamics Lab (CMHL), Shanghai Jiao Tong University, Shanghai, China
E-mail: weiwen.zhao@sjtu.edu.cn

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 complicated and violent flows around marine structures, such as surface ships, submarines, offshore wind turbines and floating platforms. All of such complicated and violent flows 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.

REFERENCES

[1] Songtao Chen, Weiwen Zhao, Decheng Wan, *On the scattering of focused wave by a finite surface-piercing circular cylinder: A numerical investigation*, Physcis of Fluids, 2022, 34: 035132; https://doi.org/10.1063/5.0086826.

[2] Guanyu Zhang, Ruosi Zha, Decheng Wan, *MPS–FEM coupled method for 3D dam-break flows with elastic gate structures*, European Journal of Mechanics / B Fluids, 2022, 94: 171-189; https://doi.org/10.1016/j.euromechflu.2022.02.014