Implement and validation of Viscous Numerical Wave Flume Based on Finite Element Method and CLEAR-VOF Method

Lin LU, Bin TENG and Bing CHEN

Summary

This work describes the numerical implements of a two-dimensional viscous numerical wave flume, which is based on the Finite Element Method (FEM), Computational lagrangian-Eulerian Advection Remap Volume of Fluid Method (CLEAR-VOF), internal wave generation and artificial wave damping technique. Owning to the inherent consistence of CLEAR-VOF with FEM, the present numerical model allows the simulations of wave propagation and interaction with structures to be simulated with irregular mesh partition. The present numerical wave flume is validated by several applications in comparisons with available experimental data and numerical results, including the problems of standing wave trains in front of vertical wall, solitary wave propagation and diffusion over vertical step, wave induced fluid resonance in narrow gaps and liquid sloshing in container with multi-baffles.