

Numerical Simulations of the Flooding inside a Damaged Cabin with Horizontal and Vertical Baffles by MPS Method

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ABSTRACT

In recent years, shipwrecking accidents occur frequently, which may break the cabin and bring danger to structures and people aboard. Therefore, it is of great significance to simulate the flooding process of a damaged cabin and estimate the time available for rescue before the ship capsizes.

In this paper, the flooding process of a two-dimensional cabin is simulated by the inner solver MPSGPU-SJTU, which is based on the meshless particle method, the moving particle semi-implicit method (MPS). The MPSGPU-SJTU solver can be run on a GPU platform, which can improve the computational efficiency significantly. Firstly, the accuracy and stability of the solver are verified by simulating the flooding process of a damage cabin. The obtained results are compared with the published results, and the horizontal and vertical displacements of the cabin are in good agreement. Then a horizontal baffle and a vertical baffle are placed into the cabin, and the flooding process of the damaged cabin with a baffle is simulated. The influence of the baffle position on the flooding process including the horizontal and vertical displacement as well as the roll angle of the damaged cabin are analysed respectively.