Numerical simulation of green water using SPH method

Liang-Jun WEN，Qiang-dong FENG

China Ship Scientific Research Center, Wuxi 214082,China

Abstract: When the ship is navigating in the sea, it is inevitable to meet the rough sea condition. In this case, the ship can suffer great danger from green water, and severe green water can cause structure damages. The flows tend to be highly dynamic, with large amounts of free surface deformation. A numerical method to simulate the phenomenon of the green water on deck is established by taking advantage of SPH method.

The paper aims to extend this method to deal with green water. The ship motion is given by potential flow theory. The ship model is regard as rigid body. Numerical results of water flow on deck and green water loads on the deck structure are compared with the corresponding experimental data. It is shown that the SPH method can be applied to describe and analyze green water.

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Reference:

Canelas RB, Domínguez JM, Crespo AJC, Gómez-Gesteira M, Ferreira RML. (2015). A Smooth Particle Hydrodynamics discretization for the modelling of free surface flows and rigid body dynamics. International Journal for Numerical Methods in Fluids, 78: 581-593.

Three relevant workshop topics:

Computational Modelling using SPH

Theoretical and Numerical Aspects of SPH

SPH Applications