

Comparison Study of Liquid Sloshing in Rectangular Tank with/without Elastic Baffle by MPS-FEM Coupled Method

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Abstract

The liquid sloshing in a tank is a common phenomenon in ship and ocean engineering, rockets launching, nuclear reactor vessel. The impact-loads due to violent oscillation of free surface may cause serious structural damage. In present paper, a vertical elastic baffle is employed to control liquid flow and suppress the fluctuation of free surface. The impact-loads and evolution of free surface are comparison studied between tank with and without elastic baffle. To numerically investigate the interaction between liquid flow and elastic baffle, the MPS-FEM (Moving Particle Semi-implicit-Finite Element Method) coupled method is proposed. The MPS method is used to simulate the motion of liquid, and capability of the MPS for sloshing problem is validated by comparing against experimental data. The FEM is used to study the deformation of baffle, and accuracy of the structural solver is validated by a published benchmark. Then, the MPS-FEM coupled solver is

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