

SPH simulation of liquid sloshing in rectangular tank

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We conducted a series of liquid sloshing simulations by SPH (Smoothed Particle Hydrodynamics) to investigate the non-linear liquid behavior supposed to an external force with the resonance period of the liquid-tank system. The SPH is a kind of numerical simulation technique based on meshless particle method, enables us to easily treat a large deformation such as wave breaking because of its lagrangian formalism on the Navier-Stokes equation.

The resonance period obtained through our simulation indicates a little bigger value compared with the theoretical solution under non-viscosity and small deformation assumptions. This leads that the incompressibility of the liquid plays an important role with respect to the decision of the resonance period. Although the theoretical solution predicts the resonance period with a certain accuracy, it can not estimate the quantitative mass of overflow. We thus tried to simulate the overflow caused by strong vibration.