Response dynamics of a floating body subjected to waves

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Synopsis

The numerical modeling of floating structures subjected to ocean waves are increasingly popular in the field of naval, coastal, and ocean engineering. Nonlinear interactions between waves and floating bodies are investigated using the Open-source CFD software OpenFOAM. OlaFlow wave boundary condition is applied to simulate the interaction of sea waves with a floating barge. The dynamic response of the freely floating barge is calculated numerically and validated with the literature data. The study concludes that the CFD model can be used effectively in predicting the response of floating barge with waves. The floating structure equipped with mooring line will be investigated in the future work.

Problem Statement

Ren et al. [1] validated the SPH model against experiments of nonlinear waves interacting with a freely floating barge. Here, the same test case is used to validate the present multiphase fluid-structure interaction solver within the framework of open-source code. The experimental data included the time series of the motions (surge, heave and pitch) of a freely floating barge. Regular waves were tested during the physical test with wave height of 4 cm and wave period of 1.2 s.

References

[1] B. Ren, M. He, P. Dong, and H. Wen, "Nonlinear simulations of wave-induced motions of a freely floating body using wcsph method," *Applied Ocean Research*, vol. 50, pp. 1–12, 2015.