

CFD modelling of floating object's motion decay

Background:

Ocean wave as a renewable energy source is accessible in many part of the world. Design of a power take-off (PTO) unit for a wave energy convertor depends on the knowledge of interaction between water surface and solid object. Study of slamming loads and motion of floating object in waves are important both from structural design point of view and from fluid-structure interaction. There are many numerical tools available to simulate the motion of a vessel in water but the accuracy of simulations and cost of the calculations are always two important factors for the design process. Evaluation of the numerical models against the experimental data is the focus of this study.

Objective:

Validating the optimum CFD solver for simulating the motion decay of floating object, in slamming and encountering wave.

Methodology:

In this project, we will study the motion of generic floating objects in free fall and incoming wave. Two master students examine different numerical approaches to simulate large motions of an object interacting with water free surface (overset mesh, sliding grid or deforming mesh). OPENFOAM and FINEMARINE are two software candidates to be used in this study. In addition, the contribution of viscous flow in large and small heave motions are investigated.

Miscellaneous:

The project starts January 2021. The supervisory team composed of Alex Shiri, Carl-Erik Janson and Laura Marimon will provide experimental scenarios, cases of generic bodies and CFD methods to simulate the motion of object.

Prerequisites:

Background in Mechanical Engineering, Naval Architecture, or similar.
Knowledge and interest in computational fluid dynamics.

Contact

Carl-Erik Janson, Professor – carl-erik.janson@chalmers.se – supervisor, department of Mechanics and Maritime Sciences, Chalmers University of Technology

Dr Alex A. Shiri – Alex.Shiri@sspa.se – co-supervisor from SSPA

Dr Laura Marimon Giovannetti – Laura.Marimon@sspa.se – co-supervisor from SSPA

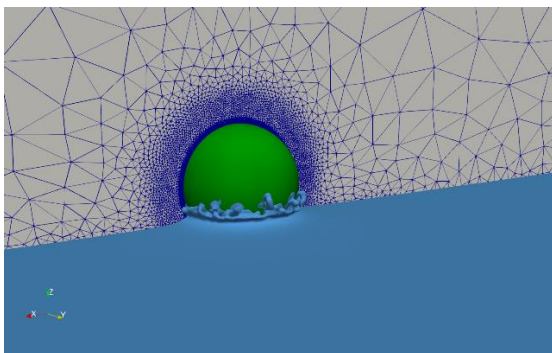


Figure 1: Free fall simulation of a sphere into water.

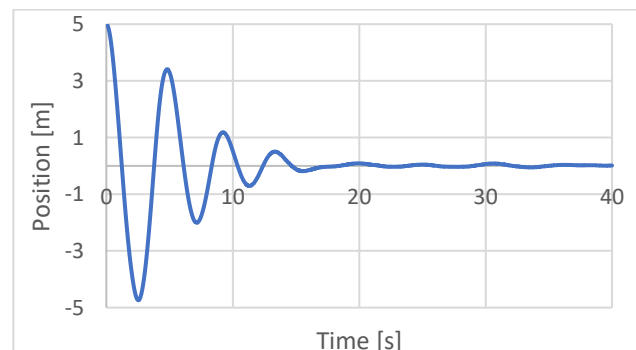


Figure 2: Decay motion of free fall.