Numerical Study of Water Impact of Rigid Sphere under the action of gravity

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Abstract:

Numerical simulations were carried out to study the water impact of a three-dimensional buoyant, rigid sphere under the influence of gravity. The simulations were done using the commercially available CFD solver FLOW3D[®]. The different hydrodynamic parameters of the rigid sphere when it strikes the liquid surface under the action of gravity are investigated in the present study. The main parameters are: displacement, velocity and acceleration as the sphere penetrates the water surface and rebounds till settlement; pressure on the sphere, the wetted surface and the net hydrodynamic forces; all as functions of time. The simulations were conducted at different impact (or touch-down) velocities. The CFD parameters (for e.g. mesh, solver etc.) used in the simulations are discussed. The CFD results are compared with experimental results available in the literature with very good accuracy.

Keywords: Water Impact, FLOW3D[®], Sphere

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