Parametric Study on the Effect of Baffles on Fuel Tank Sloshing

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Abstract

The present study describes the effect of position, sizing and configurations of baffle on the dynamics of fuel tank sloshing. The 2D grid is made with the help of blockMesh option available in the OpenFOAM solver, for T-shaped baffles in rectangular tank at different locations. 3D case geometry and meshing is carried out with the help of a commercial solver ANSYS Workbench 2021 Academic version. Both 2D and 3D simulations are performed with the solver in OpenFOAM v8. The flow physics is simulated for dynamic motion of liquid container subjected to sinusoidal motion. The transient computations are performed by incorporating the interface tracking mechanism. The obtained results are validated with the benchmark results of Akyildiz *et.al*.

Problem Statement

To study the effect of the following baffle parameters on the dynamics of fuel tank sloshing -

1. Baffles shape, size and position in the fuel tank

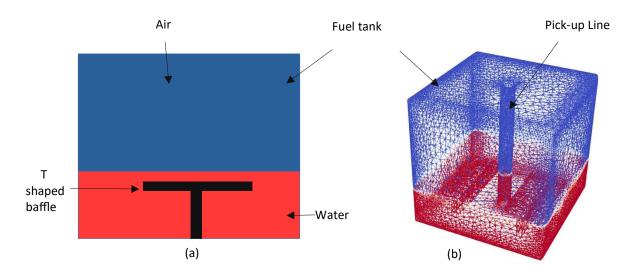2. Continuous vs. Discontinuous baffles

Figure 1. Partially filled fuel tank with baffles (a) 2D case and (b) 3D case