Numerical simulation of particle settling in an inclined vessel

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Abstract

A three-dimensional Eulerian-Lagrangian model is used to simulate sedimentation of suspended particles in an inclined vessel. Enhancement sedimentation due to global convection is observed inside the vessel, which is the phenomenon known as the Boycott effect. To model the deposition and collision of particles, a soft collision model is employed to allow for reaching the random closed packing. The sedimentation efficiencies in different angles of inclination are studied via examining release of the potential energy.
In certain angles of inclination, Kelvin-Helmholtz instability occurs on the interface between clear-fluid and particle-laden layers, which in turn reduces the settling efficiency. In this study, simulation cases of different particle size, concentrations and angles of inclination are compared.

Keywords: **Sedimentation; Boycott effect; Kelvin-Helmholtz instability; Solid-liquid two-phase flow**