Fluid–solid interaction in the case of piping erosion: Validation of a sph-ale code

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Abstrak

This paper presents a set of numerical simulations of different 2D boundary-value problems in order to validate a “smoothed-particle hydrodynamics”-“arbitrary Lagrangian-Eulerian” (SPH-ALE) code. This code is intended to be used to study, among other things, the problem of piping erosion in dams and dikes. The case of viscous fluid flows around a fixed cylinder was first examined. Different Reynolds numbers and different shapes for the cylinder were considered. The drag coefficient, lift coefficient, pressure coefficient, and Strouhal number were compared with previous studies from the literature. Next, a validation of the case of a Poiseuille flow between smooth pipe walls with Re = 100 was provided. The friction coefficient was computed and compared to existing analytical solutions.