Finite Element Method Applied to Sea Bed Morphodynamics due to Sediment Transport

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ABSTRACT

The computational modelling of oil and gas reservoir morphology is a challenging task and comprises several aspects related to enviromental flows. Finite element methods were already applied to a wide range of coupled flow problems, however, most of the efforts for numerically model this class of problem is still based on structured grid methods. In this work, an stabilized SUPG/PSPG formulation coupled to sediment transport and Arbitrary Lagrangian Eulerian (ALE) method is considered to track sea bed changes, due to turbidity currents discharges. An automatic mesh generation procedure, based on bathymetry maps, is also presented. A residual-based variational multiscale method (RB-VMS) is used as a closure model to treat turbulence effects. Validation results, against experimental data, have shown good agreement and a real case test problem is also presented.

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