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Numerical simulation of scour around pipelines using an Euler-Euler coupling two-phase model ZHIHE ZHAO, JOE FERNANDO, Arizona State University, ENVIRONMENTAL FLUID DYNAMICS GROUP TEAM — The scour around a long fixed pipeline initially located on a sandy bed is numerically simulated using an Eulerian two-phase model. This model implements Euler-Euler coupling of governing equations for both fluid and solid phases and a modified $k-\varepsilon$ turbulence closure for the fluid phase, the modeling system being a part of the computational fluid dynamics(CFD) software package Fluent. Both flow-particle and particle-particle interactions are considered in the model. During simulations, the interface between sand and water is specified using a threshold volume fraction of sand and the evolution of the bedforms is studied. The predictions of bedform evolution are in good agreement with previous laboratory measurements. Investigations into the mechanisms of scour reveal that the suspended-load and laminated-load transports are major contributors to the bedform evolution, and the former is the principal cause of scour. While some previously proposed scour development formulae for cylindrical objects are in good agreement with the simulations, scour predictions based on common operational mine-burial models show disparities with present simulations.

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