

A mesh-less smoothed particle hydrodynamics (SPH) model for bed-load transport on erosional dam-break floods is presented. This mixture model describes both the liquid phase and the solid granular material. The model is validated on the results from several experiments on erosional dam breaks. A comparison between the present model and a 2-phase SPH model for geotechnical applications (Gadget Soil; TUHH) is performed. A demonstrative 3D erosional dam break on complex topography is investigated. The present 3D mixture model is characterised by: no tuning parameter for the mixture viscosity; consistency with the Kinetic Theory of Granular Flow; ability to reproduce the evolution of the free surface and the bed-load transport layer; applicability to practical problems in civil engineering. The numerical developments of this study are represented by a new SPH scheme for bed-load transport, which is implemented in the SPH code SPHERA v.8.0 (RSE SpA), distributed as FOSS on GitHub.

