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Testing the continuum $mu(I)$ rheology for 2D granular flows on avalanches and collapse of columns PIERRE-YVES LAGRÉE, LYDIE STARON, CNRS UPMC IJLRA, STÉPHANE POPINET, NIWA — There is a large amount of experimental work dealing with dry granular flows (such as sand, glass beads, small rocks...) supporting the so called $\mu(I)$ rheology. This rheology states that the ratio of the tangential to the normal constraints behaves as a Coulomb like friction depending on the Inertial number (this number is the product of the grain size by the shear of the velocity divided by the square root of pressure divided by the grain density). Hence, we propose the implementation of this non newtonian rheology in a Navier Stokes Solver (the Gerris Flow Solver uses a finite-volume approach with the Volume-of-Fluid (VOF) method to describe variable-density two-phase flows). First we apply it on a steady infinite bi dimensional avalanching granular flow over a constant slope covered by a passive light fluid (it allows for a zero pressure boundary condition at the surface, bypassing an up to now difficulty which was to impose this condition on a unknown moving boundary). The classical analytical solution, known as Bagnold solution, is recovered numerically. Then the rheology is tested on the collapse of granular columns and quantitative comparisons with numerical simulations from Contact Dynamics are done.

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