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Numerical simulation of unsteady chute flows of two-phase granular mixtures CHRISTOS VARSAKELIS, MILTIADIS V. PAPALEXANDRIS, Université catholique de Louvain — The unsteady gravity-driven flow of a fluid-saturated granular material on an inclined plane is investigated numerically. Our studies are based on a continuum two-phase flow model for the mixtures of interest. The governing equations are integrated via a predictor-corrector algorithm that employs a generalized projection method for the computation of the phasial pressures. Further, it incorporates an interface detection and capturing method to account for the steep gradients of particle concentration across material interfaces. In our numerical setup, a dense granular layer of constant thickness is placed on the surface of an inclined plane, whereas the rest of the domain is filled with an interstitial fluid. Initially the mixture is assumed to be at rest and is accelerated by gravity. A representative sample of these simulations is presented and discussed. Since the flows of interest are susceptible to Kapitza instability, emphasis is placed on the spatio-temporal evolution of the granular layer's free surface and the interplay between inertia and gravity. Also, we discuss the flow characteristics inside the granular layer and we compare the predicted profiles for the phasial variables with those obtained from previous studies.

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