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Time-dependent granular flow down an inclined plane SUMIT KUMAR, SATYABRATA PATRO, ANURAG TRIPATHI, Indian Institute of Technology, Kanpur — The viscoplastic rheological model based on the inertial number captures the steady state rheology of granular materials in various configurations very well. In comparison, relatively little attention has been given to study the time-dependent granular flow. In this study, we numerically solve the unsteady state momentum balance equations using the constitutive model given by the $\mu - I$ rheology and predict the time-dependent flow profiles of the shear stress, pressure and velocity. We also compute these flow properties by performing DEM simulations of frictional, inelastic, spherical particles. The particles flow under the influence of gravity starting from a settled state after the inclination of the plane is suddenly increased to a desired angle. The predictions of the momentum balance equations obtained from the numerical results are compared with the DEM simulations. The validity of the numerical method for low as well as moderate inertial numbers will be discussed in this work.

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