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Rôle of the Navier-Stokes transport coefficients for hydrodynamic simulations of granular flow

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A numerical study is presented to assess the performance of two different models of kinetic transport coefficients for granular materials, namely the Jenkins-Richman theory for moderately dense, quasielastic grains, and the improved Lutsko-Garz\'o theory for arbitrary inelasticity. For this purpose a time-dependent problem such as the granular Faraday instability is selected to perform numerical simulations of the granular Navier-Stokes equations. Both solutions are compared with event-driven simulations of the same system under the same conditions, by analyzing the density, the temperature and the velocity field. Important differences are found between the two models leading to interesting implications. In particular the heat transfer mechanism coupled to the density gradient which is a distinctive feature of inelastic granular gases, is responsible for a major discrepancy in the temperature field and hence in the diffusion mechanisms.

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