

Analysis of binary and ternary granular mixtures behavior using the kinetic theory approach

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Abstract

The kinetic theory was extended to granular mixtures of different mechanical properties (size, density and/or restitution coefficient) where each particle group was considered as a separate phase with different average velocity and granular energy. This model was applied to simple shear flow of binary and ternary mixture of particles. In the parameter range studied, the theoretical behavior of a binary mixture showed a good quantitative agreement with the molecular dynamics simulation and predicted qualitatively well the experiment of Savage and Sayed [S. Savage, M. Sayed, *J. Fluid Mech.*, 142 (1984)] and Feitosa and Menon [K. Feitosa, N. Menon, *Phys. Rev. Lett.*, 88 (7) (2002)]. Furthermore, the investigation of a ternary granular mixture showed interesting results: the fluctuations were strongly damped and the granular mixture showed less resistance to the flow when the number of particulate phases with smaller particle size increased in the mixture, while the total particle concentration remained unchanged.

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