2007 Vol.48 No.2 pp.343-347 DOI:

Dynamic Properties of Two-Dimensional Polydisperse Granular Gases

LI Rui, ZHANG Duan-Ming, HUANG Ming-Tao, SU Xiang-Ying, CHEN Zhi-Yuan, ZHU Hong-Ying, and ZHANG Lin

Department of Physics, Huazhong University of Science and Technology, Wuhan 430074, China
(Received: 2006-8-17; Revised:)

Abstract: We propose a two-dimensional model of polydisperse granular mixtures with a power-law size distribution in the presence of stochastic driving. A fractal dimension D is introduced as a measurement of the inhomogeneity of the size distribution of particles. We define the global and partial granular temperatures of the multi-component mixture. By direct simulation Monte Carlo, we investigate how the inhomogeneity of the size distribution influences the dynamic properties of the mixture, focusing on the granular temperature, dissipated energy, velocity distribution, spatial clusterization, and collision time. We get the following results: a single granular temperature does not characterize a multi-component mixture and each species attains its own "granular temperature"; The velocity deviation from Gaussian distribution becomes more and more pronounced and the partial density of the assembly is more inhomogeneous with the increasing value of the fractal dimension D; The global granular temperature decreases and average dissipated energy per particle increases as the value of D augments.

PACS: 61.43.Bn. 61.43.Hv

Key words: fractal, fractal dimension, polydisperse mixture

[Full text: PDF]

Close