Kinetic temperatures for a granular mixture

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Abstract

An isolated mixture of smooth, inelastic hard spheres supports a homogeneous cooling state with different kinetic temperatures for each species. This phenomenon is explored here by molecular dynamics simulation of a two component fluid, with comparison to predictions of the Enskog kinetic theory. The ratio of kinetic temperatures is studied for two values of the restitution coefficient = 0.95 and 0.80, as a function of mass ratio, size ratio, composition, and density. Good agreement between theory and simulation is found for the lower densities and higher restitution coefficient; significant disagreement is observed otherwise. The phenomenon of different temperatures is also discussed for driven systems, as occurs in recent experiments. Differences between the freely cooling state and driven steady states are illustrated.

Key words
Kinetic Temperature, Molecular dynamics

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