Homogeneous Cooling Granular Gases of Cohesive Particles[1]

ERIC MURPHY, SHANKAR SUBRAMANIAM, Iowa State University — We consider the case of a homogeneously cooling gas of dissipative granular particles with the addition of short-range attractive potentials. An analytic solution is found using the pseudo-Liouville formalism in terms of a nondimensional ratio of interparticle potential energy to internal energy of the system. The solution reveals that the granular temperature evolution is indistinguishable from Haff's law until a critical temperature region is approached. In this critical region, an abrupt increase in cooling and aggregation are predicted. Lastly, the solution is compared against soft-sphere DEM data. The abrupt increase in cooling sheds light on the expected rheological behavior and jamming transitions in flows of such particles.

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