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Collisional Granular Flows with and without Gas Interactions in Microgravity

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We illustrate the convenience of a long-lasting microgravity environment for studying flows of granular materials with and without gas interaction. We consider collisional granular flows of nearly elastic spheres featuring a single constituent or binary mixtures in various bounded geometries. We review the equations of the kinetic theory for the conservation of mass, momentum, fluctuation energy and species concentration. We illustrate their solutions for shear flows in rectilinear or axisymmetric rectangular channels with or without a body force. We show that proper boundary conditions yield numerical solutions in good agreement with molecular dynamical simulations and with data from physical experiments carried out in microgravity.

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