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Kinetics of Weakly Frictional Granular Gases

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Although all macroscopic grains are frictional, most of the theoretical studies of granular gases have focused on models of frictionless spheres. The success of these models in explaining many experimental results raises the question of the role of frictional restitution in the dynamics of granular gases. The weak frictional limit is explored here. Using the pertinent Boltzmann equation we derive hydrodynamic equations of motion (as it turns out one needs to extend the list of hydrodynamics fields in this case) and study some of their consequences. One of these consequences is that the homogeneous cooling state is highly non-Gaussian. Another consequence is the long memory associated with the rotational degrees of freedom, when weakly coupled to translation.

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