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Dynamics of Driven Granular Gases in Periodic Structures

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The behavior of a driven granular gas in a container consisting of M connected compartments is studied employing a microscopic kinetic model. After obtaining the governing equations for the occupation numbers and the granular temperatures of each compartment we consider the various dynamical regimes. The system displays interesting analogies with the ordering processes of phase separating mixtures quenched below the their critical point. In particular, we show that below a certain value of the driving intensity the populations of the various compartments become unequal and the system clusterizes. Such a phenomenon is not instantaneous, but is characterized by a time scale, τ, which follows a Vogel-Vulcher exponential behavior. On the other hand, the reverse phenomenon which involves the “evaporation” of a cluster due to the driving force is also characterized by a second time scale which diverges at the limit of stability of the cluster.

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