JAMMING IN NONLINEAR DRIVEN MODELS

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S u m m a r y

The driven underdamped system of anharmonically interacting atoms in the periodic 1D and 2D external potential is studied. When the driving force increases, the system transfers from a locked state to an ordered sliding state corresponding to a moving crystal. It is shown that, before the transition to the sliding state, the system passes through an inhomogeneous state, where it splits into regions of immobile atoms ("traffic jams") and regions of running atoms. We propose a new model, where the particles have a complex structure treated in a mean-field fashion: the collisions of particles are inelastic, and each particle is considered as having its own thermostat. When an external force is applied to atoms, this model exhibits a hysteresis and a clustering of atoms (the traffic-jam regime) for a much wider range of model parameters than that in the classical elastic model, and both these effects survive at high temperatures.