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Inertia and the Distribution of Avalanches in Sheared Glasses
KENNETH SALERNO, MARK ROBBINS, Johns Hopkins University, CRAIG MALONEY, Carnegie Mellon University — Many slowly driven condensed matter systems show highly intermittent and spatially organized dynamics where relaxation proceeds via "avalanches". This talk describes the role of inertia in determining the distribution of avalanches in sheared glassy systems. Simulations were performed on binary mixtures of Lennard-Jones particles in two dimensions. The distribution of events was evaluated during steady-state quasi-static deformation in pure shear. The temperature was maintained at zero by damping the relative velocity of interacting particles. The damping rate was increased to transition from an inertial to an overdamped limit. The magnitude of avalanches E is defined as the energy dissipated. In the inertial limit the distribution P(E) of events follows power law scaling over more than four decades. As for earthquake fault systems, $P(E) \sim 1/E$. The largest event and number of events increase roughly linearly with the system width L for L varying from 25 to 400 particle diameters. Increasing the damping or damping the total velocity removes the large events and leads to qualitative changes in the distribution.

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