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Correlations in Particle Displacements and Plastic Deformation in Sheared Amorphous Solids MARK O. ROBBINS, K. MICHAEL SALERNO[1], Johns Hopkins University — We present results from molecular-dynamics simulations of model disordered solids under quasi-static, steady-state shear in two and three dimensions. Plastic deformation occurs through intermittent "avalanches" of local rearrangements. As in other slowly-driven systems from magnets to geologic faults, avalanches exhibit critical scaling behavior. Particle motion during avalanche events leads to local yielding and plastic strain. Local strain statistics for individual avalanche events will be discussed. Over many avalanche events long-range spatial correlations form in the particle displacement and strain fields. These correlations are seen most visibly in the power spectra of local measures of particle motion, S(q). One result of these correlations is system-size dependent effective particle "diffusion," with particle mean-square displacement that is linear in the applied strain. Results for three different particle damping regimes will be compared. Results from two and three dimensions will also be presented and compared.

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