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Heterogeneous relaxation dynamics in amorphous materials under cyclic loading NIKOLAI PRIEZJEV, Michigan State University — Molecular dynamics simulations are performed to investigate heterogeneous dynamics in amorphous glassy materials under oscillatory shear strain. We consider three-dimensional binary Lennard-Jones mixture well below the glass transition temperature. The structural relaxation and dynamic heterogeneity are quantified by means of the self-overlap order parameter and the four-point correlation function. We found that at small strain amplitudes, the mean square displacement develops an extended sub-diffusive plateau followed by the diffusive regime; whereas at larger amplitudes only the diffusive regime is present. At intermediate time and length scales, the dynamic susceptibility exhibits a pronounced peak, whose magnitude increases at larger strain amplitudes, indicating progressively larger size of dynamically correlated regions. The analysis of particle hopping dynamics reveals that the periodic deformation generates a heterogeneous temporal response characterized by intermittent bursts of large particle displacements. The role of dynamical facilitation in the formation of clusters of mobile particles is discussed.

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