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Lattice Model of Dynamic Heterogeneity in Glassy Systems¹ NICHOLAS B. TITO, JANE E.G. LIPSON, Dartmouth College, SCOTT T. MILNER, The Pennsylvania State University — Free volume in a fluid provides space for molecular motion; this creates local mobility and avoids "kinetic jamming" as the sample is rapidly cooled towards its glass transition. This physical picture has recently garnered significant interest in the polymer materials realm, where free volume is suspected to be the key factor in suppressing the glass transition of a polymer thin film near its exposed surfaces. We have developed a simple kinetic model that describes how free volume is transported in a near-glassy liquid. Model simulation results reveal that spatial fluctuations of free volume grow large near the glass transition, and this gives rise to hallmark glassy characteristics such as dynamic heterogeneity, intermittency and, ultimately, kinetic arrest. We will also discuss the response of glassy and molten states to perturbations, as a probe for characterising fluctuations near the glass transition.

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