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Activated Hopping and Dynamic Heterogeneity in Glassy Colloidal Suspensions ERICA SALTZMAN, KENNETH SCHWEIZER, University of Illinois at Urbana-Champaign — A microscopic statistical dynamical theory of barriers and activated transport in dense colloidal suspensions has been developed by combining and extending methods of mode coupling, density functional and particle hopping theories. Quasi-analytic results for the mean relaxation time and ensemble-averaged transport coefficients agree well with experiment. However, a full determination of the dynamics requires numerical integration of the nonlinear overdamped stochastic equation of motion, i.e. Brownian dynamics simulation. This enables calculation of average quantities including the mean-square displacement, incoherent dynamic scattering function and alpha relaxation time, as well as trajectory-based quantities such as displacement and relaxation time distributions. Dynamic heterogeneity effects are explored by studying various decoupling factors, the non-gaussian parameter, the bimodality of the displacement distribution and the non-Fickian wavevector dependence of the structural relaxation time. Comparisons to mode-coupling theory, simulation and experimental results are performed.

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