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Dynamics of soft spheres beyond the hard-sphere limit MICHAEL SCHMIEDEBERG, ANDREA J. LIU, University of Pennsylvania, Department of Physics and Astronomy, 209 South 33rd Street, Philadelphia, PA 19104-6396 — In the limit of low pressures the dynamics of model glass-forming liquids with finite-ranged repulsive interactions are universal. In that limit, where the product of the pressure and the particle volume is small compared to the interaction energy, soft sphere systems behave as hard spheres, so that the dynamics correspond to those of the hard-sphere glass transition and depend only on the ratio of temperature to the product of pressure and the particle volume. However, at higher pressures relative to the interaction energy, there are deviations from this universal behavior that depend on the inter-particle potential. We consider a bidisperse system consisting of soft spheres that repel each other according to a power law potential δ^α where δ is the particle overlap. By using molecular-dynamics simulations, we determine relaxation times as a function of temperature and pressure. We find that the deviations from hard-sphere behavior can be collapsed onto a single curve that depends on $p^{1/\alpha}$.

Michael Schmiedeberg
University of Pennsylvania, Department of Physics and Astronomy,
209 South 33rd Street, Philadelphia, PA 19104-6396

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