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Rheology and Dynamics of Colloidal Superballs JOHN ROYER, GEORGE BURTON, NIST, DANIEL BLAIR, Georgetown University, STEVEN HUDSON, NIST — Relatively little is known about the role particle shape plays in the dynamics of colloidal suspensions, particularly at higher packing densities where particle interactions and changes in the microstructure become increasingly important. We examine the role of particle shape by characterizing both the bulk rheology and micro-scale diffusion in a suspension of pseudo-cubic silica superballs. Varying the packing density $0 \leq \phi \leq 0.42$, we compare the high-shear viscosity and long-time self-diffusion coefficient $D_L(\phi)$ to established hard-sphere results. In dilute suspensions the superball viscosity is nearly indistinguishable from the that of hard spheres, indicating that the individual superball hydrodynamics are not dramatically different. However, there is a significant difference in the diffusion, with the superball $D_L(\phi)$ decreasing faster with increasing ϕ. Looking at the suspension microstructure, we find that while the hard sphere pair distribution $g(r)$ jumps to a finite value at contact $r = 2a$, the superball $g(r)$ is shifted to higher distances. This suggests a simple rescaling $\phi \to \phi_{eff}$ defined by the minimal sphere needed to enclose the superballs, which roughy collapses the diffusion results.

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