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Discontinuous shear thickening, or shear jamming, of dense suspensions of uniform non-spherical particles[1] RYAN LARSEN, JIN-WOONG KIM, Division of Engineering and Applied Sciences, Harvard University, DAVID WEITZ, Division of Engineering and Applied Sciences and Department of Physics, Harvard University — Discontinuous shear thickening, or shear jamming, occurs when suspensions undergo a shear-induced transition from fluid-like behavior to solid-like behavior. Because jamming is associated with geometrical confinement of the particles, it is reasonable to expect particle shape to have an effect on the jamming of suspensions. To test this dependence, we synthesize uniform polystyrene particles of dumbbell and triangle shape and compare their jamming behavior to that of equivalent spheres. We show that the non-spherical particles display more dramatic viscosity increases during jamming, and they persist in the jammed state for longer periods of time. Moreover, as the spherical particles approach the jamming transition, they oscillate stochastically between the jammed and un-jammed states on milli-second time scales, whereas the non-spherical particles display no such behavior. We rationalize these qualitative differences in jamming behavior in terms of the higher packing efficiency of non-spheres at low shear rates relative to that at high shear rates.

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