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Modelling shear jamming and fragility of concentrated suspensions

Under an applied traction, highly concentrated suspensions of solid particles in fluids can turn from a state in which they flow to a state in which they counteract the traction as an elastic solid: a shear-jammed state. Remarkably, the suspension can turn back to the flowing state simply by inverting the traction. A tensorial constitutive model is presented and its effectiveness discussed in paradigmatic cases. We show that, to reproduce the phenomenology of shear jamming in generic geometries, it is necessary to link this effect to the elastic response supported by the suspension microstructure rather than to a divergence of the viscosity.