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Dynamic shear jamming in granular suspensions IVO PETERS, SAYANTAN MAJUMDAR, HEINRICH JAEGER, University of Chicago — Jamming by shear allows a frictional granular packing to transition from an unjammed state into a jammed state while keeping the system volume and average packing fraction constant. Shear jamming of dry granular media can occur quasi-statically, but boundaries are crucial to confine the material. We perform experiments in aqueous starch suspension where we apply shear using a rheometer with a large volume (400 ml) cylindrical Couette cell. In our suspensions the packing fraction is sufficiently low that quasi-static deformation does not induce a shear jammed state. Applying a shock-like deformation however, will turn the suspension into a jammed solid. A fully jammed state is reached within tens of microseconds, and can be sustained for at least several seconds. High speed imaging of the initial process reveals a jamming front propagating radially outward through the suspension, while the suspension near the outer boundary remains quiescent. This indicates that granular suspensions can be shear jammed without the need of confining solid boundaries. Instead, confinement is most likely provided by the dynamics in the front region.

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