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Dynamics of Transient Vorticity Aligned Structures in Attractive Colloidal Suspensions AJAY NEGI, Yale University, MICHELLE BEBRIN, McGill University, CHINEDUM OSUJI, Yale University — Shear rate jumps from high to low flow rates in an attractive colloidal suspension of carbon black particles in a non-polar solvent result in the formation of transient log-like structures aligned in the vorticity direction. Optical microscopy in situ with bulk rheology shows that the appearance of these aggregates is attended by an increase in the suspension viscosity. The viscosity shows a peak and then gradually recedes with passage of time under flow in concordance with the disappearance of the log-like structures. The time at which the viscosity reaches its maximum scales inversely with the shear rate applied to the system. This emergence of the peak in viscosity appears to be controlled by a critical strain and rescaling in these terms produces a common response across several different shear rates. Alteration of the attraction strength between particles by the addition of surfactant severely inhibits the structure formation. We present a simple model to account for these observations.

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