Abstract Submitted
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Phase transition in non-brownian fiber suspensions[1] ALEXANDRE FRANCESCHINI, EMMANOUELLA FILIPPIDI, NYU, ELIZABETH GUAZZELLI, Polytech Marseille, France, DAVID PINE, NYU — The simple shear of a suspension of fibers tends to align them with the flow direction. We previously reported that the oscillatory shear of neutrally buoyant non-Brownian fibers align them with the vorticity (Franceschini A. et al. PRL, 2011). We interpreted this phenomenon as the minimization of a "corrected volume fraction" defined as a function of the strain amplitude, the average orientation and the volume fraction. Below a critical value of this parameter, the system becomes fully reversible after a few periods. Above it, fluctuations remain and the fibers align with the vorticity, subsequently reducing the value of this corrected volume fraction. We present here the collective behavior of fibers constrained at the liquid-air interface. By pinning the liquid on the wall of a Couette cell, we can have a flat interface. By modifying the surface of the fibers, we get rid of most of surface tension mediated fiber-fiber interactions. In this 2D configuration we can measure spatial correlations, as well as the position and orientation of every fiber at each shear cycle. We similarly define a "corrected surface fraction" and see how this parameter help us understand the difference between the surface behavior and the suspension behavior.

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