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Experimental measurements of stress redistribution in flowing emulsions ERIC WEEKS, KENNETH DESMOND, Physics Dept., Emory University — We study how local rearrangements alter droplet stresses within flowing dense quasi-two-dimensional emulsions at area fractions $\phi > 0.87$. Using microscopy, we measure droplet positions while simultaneously using their deformed shape to measure droplet stresses. We find that rearrangements alter nearby stresses in a quadrupolar pattern: stresses on neighboring droplets tend to either decrease or increase depending on location. The stress redistribution is more anisotropic with increasing ϕ. The spatial character of the stress redistribution influences where subsequent rearrangements occur. Our results provide direct quantitative support for rheological theories of dense amorphous materials that connect local rearrangements to changes in nearby stress.

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