Wilson, Helen J.


Summary: The bizarre behaviour of a cornstarch suspension (sometimes called oobleck) is well known to all of us who have led public engagement events. At the right solids fraction, it flows smoothly at slow speeds, but can be shattered with a quick spoon movement; if you prepare a large enough sample, you can run across the surface (but if you stand still, you will sink). In rheology circles this phenomenon is known as shear thickening, though the flows described above are not necessarily shear-dominated. In recent years there has been a proliferation of research on the mechanism behind true shear thickening, using both experiments and numerical simulations of shear flows. The understanding of the underlying mechanism is improving markedly. But the paper ‘Microstructure and thickening of dense suspensions under extensional and shear flows’ [R. Seto et al., ibid. 825, R3, 13 p. (2017; Zbl 1374.76231)] is the first to consider more general flows. We have, for the first time, simulations of thickening in extensional flows, which are a far better description of oobleck with a runner on top – and can begin to quantify the difference between the idealised shear thickening and the extension thickening that happens in practice.

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References:
