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Paradoxical ratcheting in cornstarch suspensions TROY SHINBROT, THEO SIU, MATTHEW RUTALA, Rutgers University — Cornstarch suspensions are well known to exhibit strong shear thickening, and we show as a result that they must – and do – climb vertically vibrating rods and plates. This occurs because when the rod moves upward, it shears the suspension *against* gravity, and so the fluid stiffens, but when the rod moves downward, the suspension moves *with* gravity, and so the fluid is more compliant. This causes the fluid to be dragged up by the upstroke more than it is dragged down by the downstroke, effectively ratcheting the fluid up the rod every cycle. We show experimentally and computationally that this effect is paradoxically caused by gravity – and so goes away when gravity is removed – and we show that the suspension can be made to balance on the uphill side of an inclined rod in an analog of the inverted "Kapitza pendulum," closely related to the recent report by Ramachandran & Nosonovsky, Soft Matter **10** (2014) 4633.

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