LadHyX extra Seminar – June 15th, 10:45

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Lubricated Hele-Shaw cells and fracturing of shear-thinning fluids.

Floating ice shelves often display longitudinal fractures where they emerge from embayments and start spreading radially. Similar behaviour has been seen in analogue laboratory studies using xanthan gum. In each case, the spreading flow is bounded above and below by essentially inviscid fluids (air and water), so to leading order has no internal shear stress but is rather dominated by extensional stresses. I will describe a linear stability analysis of two-dimensional, radial extrusions of power-law fluids, which reveals a new instability associated with the relief of hoop stresses. The flow of ice shelves and their laboratory analogues is complicated by buoyancy effects that cause three-dimensional variations, so I will also describe efforts to design experiments in lubricated Hele-Shaw cells that align more closely with the two-dimensional stability analysis.