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Buckling and stretching of thin viscous sheets DOIREANN O'KIELY, CHRIS BREWARD, IAN GRIFFITHS, PETER HOWELL, Mathematical Institute, University of Oxford, ULRICH LANGE, Schott AG — Thin glass sheets are used in smartphone, battery and semiconductor technology, and may be manufactured by producing a relatively thick glass slab and subsequently redrawing it to a required thickness. The resulting sheets commonly possess undesired centerline ripples and thick edges. We present a mathematical model in which a viscous sheet undergoes redraw in the direction of gravity, and show that, in a sufficiently strong gravitational field, buckling is driven by compression in a region near the bottom of the sheet, and limited by viscous resistance to stretching of the sheet. We use asymptotic analysis in the thin-sheet, low-Reynolds-number limit to determine the centerline profile and growth rate of such a viscous sheet.

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