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1D modelling of very viscous dripping flows with surface tension[1]
YVONNE STOKES, ERNIE TUCK, The University of Adelaide, CHRISTOPHER VOYCE[2], University of Oxford, BRONWYN BRADSHAW-HAJEK[3], University of South Australia — Honey dripping from an upturned spoon is an everyday example of a flow that extends and breaks up into drops. Such flows have been of interest for over 300 years, attracting the attention of Plateau and Rayleigh among others. Ink-jet printing has motivated considerable interest in recent times. Nevertheless aspects of these flows are still not fully understood. One that has been relatively unexplored is the influence of initial conditions on the evolution of a drop and filament and the final breakup. We consider a drop of very viscous fluid hanging beneath a solid boundary, similar to honey dripping from a spoon. Potentially, gravity, surface tension and inertia all play a role. We here focus on 1D modelling including gravity and surface tension but neglecting inertia which has little effect for some time. The inclusion of surface tension in a 1D model presents a challenge, since the model breaks down at the very bottom of the drop. We present a method for solving the outer problem.

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