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The spreading of a viscoplastic droplet by capillary action MAZIYAR JALAAL, Department of Mechanical Engineering, University of British Columbia, NEIL BALMFORTH, Department of Mathematics, University of British Columbia, BORIS STOEBER, Department of Mechanical Engineering, University of British Columbia — The spreading of yield stress liquid droplets on a dry surface occurs in a number of applications such as 3D printing. In the current study, the surface-tension-driven spreading of a yield-stress (Bingham) droplet on a solid wetting surface is studied. Neglecting gravity and using lubrication theory for viscoplastic fluids, we derived the thin film equation in 2D. Equations were solved numerically, where to avoid the moving contact line singularity, we used a pre-wetted film. Numerical solutions show the decelerating spreading of the droplet and its arrest due to the yield stress. Additionally, the final shape of the droplets was constructed, using an asymptotic method. Results were compared with the numerical solutions, where agreements were observed.

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