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Inertial and three-dimensional effects in stretching liquid bridges near plates and cavities SHAWN DODDS, University of Minnesota, MARCIO CARVALHO, Pontifícia Universidade Católica do Rio de Janeiro, SATISH KUMAR, University of Minnesota — The dynamics of liquid bridges are relevant to a wide variety of applications, including high-speed printing and extensional rheometry. Analysis of these systems is often performed assuming axisymmetric Stokes flow, although in printing processes these assumptions may not always hold. To address this issue, we use the finite element method to study the stretching of a finite volume of liquid between two surfaces in two model problems. In the first problem, we consider an axisymmetric liquid bridge between a stationary cavity and a moving flat plate. The contact lines are allowed to slip, and we evaluate the effect of the Reynolds number and contact angle on the transfer of liquid to the moving plate. For fixed contact angles, an increase in the Reynolds number leads to an increase in the liquid transfer. In the second problem, we consider a cylindrical liquid bridge with fixed contact lines between two flat plates, one of which is stationary while the other is simultaneously stretching and rotating. As the rotation rate is increased for a fixed stretching rate, the liquid transfer to the rotating plate is decreased. The mechanisms behind these observations will be discussed.

Shawn Dodds
University of Minnesota

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