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The role of surface viscous stresses in the liquid thread breakup HANSOL WEE, Purdue University, PRITISH KAMAT, Dow Incorporated, OSMAN BASARAN, Purdue University — Many industrial processes involving emulsions, foams, and inkjet printing exploit the ability of surfactants to adsorb onto and lower the surface tension of water-air and water-oil interfaces. In addition to lowering surface tension, surfactants may induce Marangoni stresses and cause surface rheological effects. Therefore, the dynamics of free surface flows can be significantly altered by their presence. Although much attention has been paid to date to the influence of Marangoni stresses and solutocapillarity, the effect of surface viscous stresses has been inadequately studied given the difficulty in measuring surface viscosities due to the presence of surfactants. Using a simple model that they vary linearly with concentration, we examine their effect on thread breakup by 1D simulations using the slender-jet approximation. The results obtained with the 1D algorithm are confirmed by direct comparison against predictions made with a 3D but axisymmetric free surface solver.

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