

Abstract Submitted
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Rinsing and Mixing Flows of Miscible Liquids GERALD FULLER,
Stanford University — Mixing and rinsing of miscible liquids are common processes. At home, these include the washing plates by rinsing soap layers with jets of water and the dissolution of honey into water where viscous pendant or sessile drops of honey spread into low viscosity water. These processes, common to everyday experience, present fascinating fluid mechanical phenomena. These are also encountered in manufacturing operations, such formulating personal and food products, and in the cleaning of semiconductor substrates. This paper describes experiments and theoretical analyses of several classes of miscible liquid flows. Rinsing flows where jets of water impinging on precoated layers of polymer solutions provide very effective removal of colloidal particles adsorbed onto planar substrates (silicon wafers). When the lower substrate is set in rotation, as is the case in spin coating, similarity solutions are presented that explain the spreading dynamics of liquids flowing across coatings of miscible liquids. Pendant and sessile drops of viscous liquids residing within less viscous media undergo fascinating shape changes. It is demonstrated the dissolution dynamics of both drop geometries can be successfully scaled using convection/diffusion arguments.

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