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Passing of a drop from one surface to another: a simulation and analytical study ALIDAD AMIRFAZLI, Department of Mechanical Engineering, York University, TIAN TANG, HUANCHEN CHEN, Department of Mechanical Engineering, University of Alberta — Due to its high throughput and cost-effectiveness, offset printing is a widely used printing technique in which the ink is transferred from a substrate to the target surface. A thorough understanding of liquid transfer between two solid surfaces can significantly improve the working efficiency of offset printing. Depending on the approaching and separation speeds of the surfaces, their wettability and liquid viscosity, the liquid transfer can be categorized into two regimes: quasi-static regime where the surface tension force dominates, and dynamic regime where contributions from viscous and inertia forces are not negligible; however, the delineating conditions for these two regimes are not understood. In this work, a numerical model based on the volume of fluid method was developed to study the liquid transfer under different approaching and separation speeds. The effect of dynamic contact angle is included. With this model, the liquid transfer ratio (the amount of liquid transferred to the acceptor surface over the total amount of liquid) is calculated and used to determine the boundary between the quasi-static and the dynamic regimes. A systematic study is conducted on how the transfer ratio is affected by the speed of the surfaces, viscosity of liquid and surface's wettability in the dynamic regime.

Huanchen Chen
Department of Mechanical Engineering, University of Alberta

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