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Stretching bridges and bubbles: The effect of air bubbles on liquid transfer SHAWN DODDS, University of Minnesota, MARCIO S. CARVALHO, PUC-Rio, SATISH KUMAR, University of Minnesota — The transfer of liquid from one surface to another is important in a wide variety of both natural and industrial settings. A potential complication in an application such as printing is the entrapment of air bubbles, which can alter the amount of liquid transferred to the substrate, and can produce defects if the bubbles do not burst before drying. To better understand this effect, we use flow visualization to study the stretching of liquid bridges at low capillary numbers. The bridges are visualized from beneath the drop to track the motion of the contact lines, and from beside the drop to enable image analysis to quantify liquid transfer. The dynamics of the outer gas-liquid interface, between the drop and the surrounding air, are found to be the same during stretching both with and without a bubble; thus, the volume of fluid (liquid or liquid plus bubble) transferred to the moving surface is the same in both cases, regardless of the dynamics of the bubble. Therefore, the liquid transfer will increase if the bubble remains on the stationary surface after breakup, or decrease if it transfers to the moving surface. The effect of the wettability of the surfaces on the breakup behavior of the liquid bridge is also discussed.

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