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The shape of a drop between two rigid fibers SUZIE PROTIERE, CNRS/Institut Jean le Rond d'Alembert, CAMILLE DUPRAT, HOWARD A. STONE, MAE-Princeton University — Wetting of fibrous media is observed in many engineered systems, e.g. filters, textiles, paper etc. and may also be found in Nature (e.g. hair or feathers). To understand the basic response of such material when interacting with a liquid we study the model system of a finite volume of liquid on two parallel rigid fibers. A liquid wetting the fibers can adopt two distinct equilibrium shapes: a compact hemispherical drop shape or a long liquid column of constant cross-section. These two morphologies depend on the inter-fiber distance, the liquid volume, the fiber radius and the liquid-fiber contact angle. We study the transitions between a drop shape and a column by incrementally varying the inter-fiber distance and find that the transition depends on the global geometry of the system as well as on the volume of liquid. More surprisingly we find that these two morphological states may coexist for certain parameter values. These switches in morphologies may be used to manipulate or transport liquid at a small scale.

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