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Coupling between meniscus dynamics and corner flow near a junction LINGGUO DU, HUGUES BODIGUEL, ANNIE COLIN, LOF, CNRS UMR 5258, univ. Bordeaux 1, Rhodia — The movement of a liquid-liquid meniscus in a circular tube at small capillary numbers is a rather simple problem since it follows Poiseuille's law with an effective pressure that incorporates the capillary pressure. However, for a tube of arbitrary cross-section exhibiting sharp corners, capillarity requires that the wetting liquid remains along the corners. These corner films may flow. In this work we experimentally investigate the role of these corner flows on the dynamics of a liquid-liquid meniscus, in total wetting conditions, by taking advantage of a microfluidic PDMS cross-junction. Our results show that there is a strong coupling between the corner flows and the displacement of meniscus, when it lies in the vicinity of the junction (up to 10 times the channel width $50\mu m$). Part of the observations is accounted for by a model based on a network of adaptive hydrodynamic resistances. However, when the size of the corner film is high, a more detailed description of the interface shape is required to account for the observations.

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