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Distribution of two miscible fluids at a T-junction CASEY KARST, BRIAN STOREY, JOHN GEDDES, Olin College — When a fluid comprised of multiple phases or constituents flows through a network, how the phases distribute throughout the network is a fundamental and important question. If one focuses at a single bifurcation where an incoming branch splits into two daughter branches, many systems have a phase fraction in the daughter branches which is different than the incoming branch. In this work, laminar stratified flow of two miscible fluids with different viscosity at a T junction is explored with experiments and simulation. The phase distribution as a function of flow ratio in the daughter branches is explored. The distribution depends on the incoming Reynolds number, viscosity ratio, and incoming volume fraction. Good agreement between experiment and simulation is found. The results may be relevant for microfluidic networks with two or more fluids, or networks involving blood flow (either microfluidic or microvascular) where the red blood cells and plasma distribute unevenly throughout the network.

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