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Local control of periodic pattern formation in driven binary immiscible fluid OLGA KUKSENOK, Chemical Engineering Department, University of Pittsburgh, Pittsburgh, PA, DAVID JASNOW, Physics and Astronomy Department, University of Pittsburgh, Pittsburgh, PA, ANNA C. BALAZS, Chemical Engineering Department, University of Pittsburgh, Pittsburgh, PA — Via a coarse-grained model, we simulate the dynamics of a binary, immiscible blend that is driven through a three dimensional microchannel. At the inlet of the channel, we assume a checkerboard arrangement of the components. We find that local perturbations in the temperature at the center of this checkerboard pattern can be exploited to create periodic, oscillatory patterns along the length of the channel. We derive scaling arguments that allow us to estimate the period of the oscillatory structures. We also analyze the stability of these patterns and the mechanism for the wavelength selection within the system. We find that relatively small changes in the local perturbations at the inlet of the channel can lead to dramatic changes in the morphology along the channel's length and can be used to design well-controlled periodic structures.

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