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Optimizing Chaotic Mixing in a Two-Inlet Microfluidic Channel by Out-of-Phase Pulsing. DAVID CHANG, RODOLPHE CHABREYRIE, NADINE AUBRY, Mechanical Engineering Department, Carnegie Mellon University, Pittsburgh, PA 15215 — While mixing is often a necessary step in microfluidic applications, it has proven to be difficult at small scale. Our focus has been on the generation of chaotic mixing by using out-of-phase pulsing in two-inlet channels, such as T or Y channels. Cases ranging from in-phase to anti-phase inlet pulsing have been simulated to optimize the size of the chaotic mixing region. Poincaré analysis was performed for each of the cases and the area of chaotic mixing was measured to determine the value of the parameters leading to the best mixing results. In addition, Lagrangian Coherent Structures (LCS) were be identified from the Finite-Time Lyapunov Exponent Maps (FTLE) for certain parameter values.

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