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# Chaotic Mixing and Resonances in a Microfluidic System

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The paper is dedicated to the study of a particular system – the cross-channel micromixer; this system consists of a main channel where two fluids, flowing side by side, are perturbed by a transverse, oscillating periodic flow, in a cross-channel intersection. The perturbation leads to the formation of tendrils and whorls, inducing chaotic-like regimes. This particular system is the host of a novel phenomenon – a spatio-temporal resonance effect, in which the interface between the two fluids returns to its original shape after it has been perturbed, if certain conditions on the frequency of the perturbation are satisfied. The paper shows an experimental study of the resonances and chaotic regimes, using a microfluidic device, in which PDMS integrated valves, remotely controlled, allow to produce the transverse oscillating flow, under well defined conditions

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