

Abstract Submitted
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A Novel Miniaturized Mixer Based on a Wankel Geometry

PANKAJ KUMAR, STEPHEN WAN, IHPC, A-Star — Mixing in microfluidic systems is a challenge since the flow regime encountered in these systems is typically very low Reynolds number laminar flow, in which viscous forces dominate inertial forces, which precludes efficient turbulence-based mixing. Mixing based purely on diffusion is also not a practical alternative due to the long times required to achieve a sufficient level of mixing. The present study presents a pump based on Wankel geometry as a mixer for efficient mixing in a microfluidic system. Then, a novel modification to the internal geometry of the Wankel-pump-mixer is analyzed and is shown to enable robust mixing without the introduction of an additional system component and hence without the expense of undesirable dead volume. The Lagrangian Coherent Structures (LCS) calculated from the Finite-Time Lyapunov Exponent (FTLE) field with a mixing measure is used to quantify the mixing.

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