GRADUATE STUDENT RESEARCH SEMINAR SERIES (2018)

CHAOTIC MIXING BY MICRO-ROTORS IN A CONFINED DOMAIN

SPEAKER: SENBAGARAMAN SUDARSANAM

Microfluidic Lab On a Chip devices often encounter the need to mix small samples of fluids. Mixing of fluids is a challenge in low Reynolds number regimes of fluid flow such as those found in microfluidic devices. While several experimental techniques to break the orderly laminar characteristics of microfluidic flows to improve mixing have been developed, theoretical and computational studies of dynamical systems inspired by microfluidic flow systems have been studied over the past three decades as means to identify effective methods of microfluidic mixing. The underlying motivation to study microfluidic systems as a dynamical system is the notion of chaotic advection where trajectories of a dynamical system are known to exhibit deterministic chaos even for two dimensional systems with periodic time dependence. In this work, we show by means of a simple dynamical system model that a small number of micro-rotors or spinning spheres are capable of exhibiting complex dynamics when confined inside a bounding contour and we demonstrate the possibility of effectively mixing fluids using such micro-rotors.

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