

Abstract Submitted  
for the DFD17 Meeting of  
The American Physical Society

**Mixing in flows induced by singularities** SENBAGARAMAN SUDARSANAM, PHANINDRA TALLAPRAGADA, Clemson University — Nonlinearity of fluid flows is the leading cause of rapid mixing at macroscopic length scales, with mixing due to viscous diffusion occurring at much smaller length and much larger time scales. Linearized viscous flows also known as stokes flow is a regime of fluid flow characterized by reversibility of the flow and negligible nonlinearity, making mixing of two fluids in this regime a challenge. However, it is now well established that the Lagrangian trajectories of stokes flow can exhibit deterministic chaos even for the simple case of two dimensional flows with periodic time dependence. We use the singularity method to model several time periodic stokes flows in bounded domains and investigate the mixing induced in these flows. We construct several mixing prototypes of flows due to Stokes flow singularities and analyze the mixing using geometric and probabilistic tools used for studying phase space transport in dynamical systems.

Phanindra Tallapragada  
Clemson University

Date submitted: 01 Aug 2017

Electronic form version 1.4