

Abstract Submitted  
for the DFD15 Meeting of  
The American Physical Society

**Characterizing mixing in time periodic planar flows through the topology of almost cyclic sets** PRADEEP RAO, MathWorks Inc., MARK STREMLER, SHANE ROSS, Virginia Tech — Almost Invariant Sets (AIS) can be used to identify coherent structures that move as Almost Cyclic Sets (ACS) for time-periodic planar flows. The relative motion of the ACS identified using the second most dominant eigenvector of the reversible matrix obtained from the discretized Perron-Frobenius operator provides a reduced order model for quantifying transport. This has been shown through the application of the Thurston-Nielsen classification theorem to the topology of the motions of the ACS for certain time periodic lid driven cavity Stokes flows. We extend this notion to more general flows with inertial effects. We provide a recipe for identifying the ACS whose dynamics provide a reduced order model for predicting mixing efficiency for such flows.

Pradeep Rao  
MathWorks Inc.

Date submitted: 01 Aug 2015

Electronic form version 1.4