Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Distinguished trajectories in time-dependent flows[1] JOSÉ ANTONIO JIMÉNEZ MADRID, ANA MARIA MANCHO, Department of Mathematics. IMAFF, CSIC. — The theory of dynamical systems has provided recently a good framework to describe transport in time dependent aperiodic flows. It was first applied to Lagrangian transport in the context of 2D time-periodic flows and stationary 3D flows. Recently these techniques have been extended to describe aperiodic flows. Mathematical theory for aperiodic time dependent flows is far from being completely developed. In the context of stationary flows the idea of *fixed point* is a keystone to describe geometrically the solutions. It is extended to time periodic flows, as periodic orbits become fixed points on the Poincaré map. Recent articles by Ide *et al.* and Ju *et al.* provide an important step-forwards to extend the concept of hyperbolic fixed point to aperiodic dynamical systems. Following these ideas, we propose a new formal definition of *Distinguished trajectory* (DT) in aperiodic flows. We numerically test this definition in forced Duffing type flows with known exact distinguished trajectories. The definition accurately locates these trajectories. We also check the defintion for examples of aperiodic flows in oceanographic contexts and we find that it overcomes some technical difficulties of former approaches.

[1]Supported by grants PI-200650I224 and OCEANTECH-PIF06-059 (CSIC).

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Date submitted: 04 Sep 2007 Electronic form version 1.4