



Computation of coherent structures in models of geophysical fluid dynamics

Naratip Santitissadeekorn and Gary Froyland
University of New South Wales, Australia (santitn@unsw.edu.au)

Fluid transport and mixing processes play an important role in many natural phenomena. The transfer operator approach to fluid transport studies the relaxation of initial ensemble densities, and detects those densities that relax more slowly than the rate of local trajectory separation. Such non-dispersive ensembles are known as "coherent sets", "strange eigenmodes" or "persistent patterns". We will present a new computational method to identify and track coherent sets associated with time-dependent geophysical systems. We will illustrate our approach with a two-dimensional, incompressible zonal jet flow with three superimposed traveling Rossby waves, representing a simplified model system of the Lagrangian dynamics of zonal jets in the atmosphere.