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Stochastic perturbation of inertial solutions of 2-D Quasi-Geostrophic and related models

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Mid-latitude oceans exhibit large-scale structures which are persistent over centuries. They are in general associated with strong eastward jets. We first show that, ***contrary to the usual belief, there exist stable inertial equilibria of invisicid QG models which indeed exhibit such mid-basin eastward jets***.

Observations of the mid-latitude oceans exhibit highly complex multi-scale dynamics associated with interannual and interdecadal oscillations superimposed to a statistical mean state. Hence **we study the effect of dissipation and weak stochastic forcing close to some 2-D incompressible equilibria**. We study the invariant measures for such systems and their relations with inertial equilibria and the inertial statistical mechanics of Robert Sommeria and Miller (RSM theory).

The existence of inertial nonlinear equilibria allow us to study the linear and weakly nonlinear dynamics close to basic states. We address such problems in both a deterministic and stochastic context. In particular, we are interested by the relationship between ***forcing and dissipative mechanisms*** and how they ***select one particular steady state from the infinity of inertial steady states*** in 2-D QG or Euler equations, in the limit of very high Reynolds numbers.