1083-76-186 **Xiaoliang Wan*** (xlwan@math.lsu.edu), 226 Lockett Hall, Louisiana State University, Baton Rouge, LA 70803. *A study on hydrodynamic stability using large deviation theory.*

In this work, we study the nonlinear instability of two-dimensional Poiseuille flows in a long channel from the large deviation point of view. We start from the Navier-Stokes equations perturbed by small space-time white noise. When the amplitude of the noise goes to zero, the Frendlin-Wentzell (F-W) large deviation theory for random perturbations of dynamical systems provides the insight for the transition between metastable states in the phase space through the minimizers of the F-W action functional. We use numerical techniques to minimize the F-W action functional and use it to define a new critical Reynolds number for the nonlinear instability. The new stability theory is applied to study two-dimensional Poiseuille flows in a long channel. (Received August 27, 2012)