Meeting: 1001, Evanston, Illinois, SS 11A, Special Session on Stability Issues in Fluid Dynamics

1001-76-336 **Tiian Ma**, Department of Mathematics, Indiana University, Bloomington, IN 47405, and
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Dynamic Bifurcation in Geophysical Fluid Dynamics.

We shall present in this talk our recent work on a new dynamic bifurcation theory and its applications to geophysical fluid dynamics. The theory is presented for general nonlinear evolution equations. The application is focused on the Boussinesq equations, a typical prototype model in geophysica fluid dynamics. The main results for the Boussinesq equations include 1) the existence of bifurcation from the trivial solution when the Rayleigh number R crosses the first critical Rayleigh number Rc for all physically sound boundary conditions, regardless of the multiplicity of the eigenvalue Rc for the linear problem, 2) aymptotical stability of the bifurcated solutions, and 3) the roll structure and its stability in the physical space. Applications to the Kuramoto-Sivashinsky equation and the Taylor problem are also indicated. (Received August 30, 2004)