Meeting: 998, Houston, Texas, SS 8A, Special Session on Dynamical Systems

998-37-409 **Philip L Boyland*** (boyand@math.ufl.edu), Department of Mathematics, University of Florida, 338 Little Hall, Gainesville, FL 32611-8105. *Dynamics of 2D time-periodic Euler flows.* Preliminary report.

Because inviscid, incompressible 2D fluid flows passively transport their vorticity, the time T-flow map, f, of a T-periodic inviscid flow preserves the level sets of its initial vorticity. Thus if the initial vorticity has nonvanishing gradient almost everywhere, f has zero topological entropy. This is a well known. However, certain topological configurations of "stirrer" motions always imply positive entropy by the Thurston-Nielsen theory, and so can only happen for curl-free inviscid periodic flows. The linear variational equations of such flows are time-dependent linear systems with special structure, namely, symmetric, trace-less coefficient matrices. We give several stability results for these systems and discuss their implications for the fluid flow. (Received March 02, 2004)