Meeting: 1000, Albuquerque, New Mexico, SS 9A, Special Session on Mathematical Methods in Turbulence

1000-76-122 **Juan M Lopez*** (lopez@math.asu.edu), Department of Mathematics and Statistics, Arizona State Univeristy, Tempe, AZ 85297. *Hydrodynamic Spatio-temporal Complexity.*

Taylor-Couette flow between two concentric rotating cylinders continues to provide a canonical physical system that has been instrumental in developments in nonlinear dynamics, routes to chaos, and equivariant dynamical systems. The study of the influence of endwalls and reflection symmetry at the annulus half-height opened up a new perspective into the importance of Z_2 symmetry (reflection) in Taylor-Couette flow, as well as in many other equivariant problems. The impact of Z_2 symmetry is enhanced as the aspect ratio of the annulus is reduced. Most theoretical and numerical studies of short annulus Taylor-Couette flow have been restricted to an axisymmetric subspace and have primarily considered steady Z_2-symmetry breaking. Experimentally however, very rich and complex spatiotemporal dynamics, including global bifurcations, have been observed that are intrinsically associated with the Z_2 equivariance of the system. Equivariant bifurcation theory provides a classification of possible bifurcation scenarios that may occur in the presence of symmetries. In this talk, we investigate numerically the dynamics at aspect ratio between 2 and 4 using a three-dimensional Navier-Stokes spectral solver, and compare with recent experimental observations. (Received August 20, 2004)