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Experimental search for Exact Coherent Structures in turbulent small aspect ratio Taylor-Couette flow¹ CHRISTOPHER J. CROWLEY, MICHAEL KRYGIER, ROMAN O. GRIGORIEV, MICHAEL F. SCHATZ, Georgia Institute of Technology — Recent theoretical and experimental work suggests that the dynamics of turbulent flows are guided by unstable nonchaotic solutions to the Navier-Stokes equations. These solutions, known as exact coherent structures (ECS), play a key role in a fundamentally deterministic description of turbulence. In order to quantitatively demonstrate that actual turbulence in 3D flows is guided by ECS, high resolution, 3D-3C experimental measurements of the velocity need to be compared to solutions from direct numerical simulation of the Navier-Stokes equations. In this talk, we will present experimental measurements of fully time resolved, velocity measurements in a volume of turbulence in a counter-rotating, small aspect ratio Taylor-Couette flow.

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