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**A Search for Exact Coherent Structures in Transitional Taylor-Coutte Flow**[1] DANIEL BORRERO-ECHEVERRY, Center for Nonlinear Science, Georgia Institute of Technology, DONALD R. WEBSTER, School of Civil & Environmental Engineering, Georgia Institute of Technology, RANDALL TAGG, Department of Physics, University of Colorado at Denver, MICHAEL F. SCHATZ, Center for Nonlinear Science, Georgia Institute of Technology — Theoretical and numerical studies have suggested that unstable, exact solutions of the Navier-Stokes equations known as Exact Coherent Structures (ECS) may provide a foundation for a simplified dynamical description of turbulence. We use tomographic particle image velocimetry to measure the velocity field of transitional Taylor-Coutte flow (TCF). Specifically, we present spatially and temporally resolved measurements of three-component, three-dimensional velocity fields of turbulent patches that show up when TCF undergoes a subcritical transition to turbulence. This transition occurs when only the outer cylinder rotates and is different from the famous transition driven by centrifugal instabilities. TCF offers the best opportunity to make the connection with current ECS theory since it maintains some of its assumptions (streamwise periodic boundary conditions and plane Couette flow (in the small-gap limit)), but also includes realistic effects (no-slip spanwise boundary conditions).

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