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The Effects of Varying Horizontal Boundary Conditions on the Momentum Distribution and Subcritical Turbulent Transition within Taylor-Couette Flow K.R. MCDONALD, C.J. CZARNOCKI, M.J. BURIN, CSUSM — We have experimentally investigated the momentum distribution and transition to turbulence within a high curvature (radii ratio of 0.55), low aspect ratio (height/gap of 6.3) Taylor-Couette flow using three different horizontal boundary conditions. End-caps between the two cylinders were wholly coupled to either the inner or outer cylinder, or otherwise split in half. By rotating only the outer cylinder we have obtained velocity data from fully cyclonic regimes using Laser Doppler Velocimetry (LDV). The subcritical transition to turbulence is clearly affected by the horizontal boundaries: end-caps that move with either cylinder yield a transition Reynolds number that is higher than when split. These results help clarify the role of secondary flows in the turbulent transition of this system, and also add to the early torque-based work of Wendt (1933) & Taylor (1936).

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