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The Effects of Varying Horizontal Boundary Conditions on the
Momentum Distribution and Subcritical Turbulent Transition within
Taylor-Couette Flow

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CSUSM — We have experimentally investigated the momentum distribution and
transition to turbulence within a high curvature (radii ratio of 0.55), low aspect ra-
tio (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 Ve-
locimetry (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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