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Subcritical Transition and Spiral Turbulence in Taylor-Couette Flow M.J. BURIN, C.J. CZARNOCKI, T. DAPRON, K.R. MCDONALD, CSU San Marcos — We present measurements characterizing the transition to turbulence in Taylor-Couette flow for a fully cyclonic regime, i.e. with only the outer cylinder rotating. Under this arrangement the flow is linearly-stable and the shear-driven transition to turbulence is understood to be both 'catastrophic' and spatiotemporally intermittent. En route to a fully turbulent state, we observe a regime featuring co-extant laminar/turbulent domains known as spiral turbulence. To better understand this regime, and the transition in general, we have obtained velocimetry data (via LDV) and angular momentum transport estimates (via torque), in addition to flow visualization. These observations are discussed with respect to similar transition phenomena in planar and counter-rotating Couette flows. By utilizing three different inner cylinder radii within the apparatus, we also demonstrate the sensitivity of the subcritical transition scenario to annular gap width.

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