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Tomographic PIV Observations of the Growth of Localized Perturbations in Transitional Taylor-Couette Flow[1] DANIEL BORRERO, MICHAEL SCHATZ, Georgia Institute of Technology — The flow between concentric rotating cylinders has been extensively studied over the years. Most studies have focused on the flow patterns that emerge from centrifugal instabilities and at highly turbulent regimes. More recently, however, there has been renewed interest in centrifugally stable Taylor-Couette flows, which bypass linear instability mechanisms and undergo a direct transition to turbulence. This transition shares many features with the direct transition to turbulence in other canonical shear flows that are linearly stable, such as pipe and plane Couette flows, including spatiotemporal intermittency and the coexistence of laminar and turbulent domains. We present tomographic PIV and flow visualization measurements of the growth of finite-size perturbations to the laminar state as they grow into persistent turbulent spots. In particular, we look at how the amplitude and duration of the perturbations affect the transition to turbulence and study the detailed three-dimensional structure of turbulent spots.

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