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Elastic turbulence in the Taylor-Couette system with a shear-thinning polymer solution INNOCENT MUTABAZI, NOUREDDINE LATRACHE, OLIVIER CRUMEYROLLE, Le Havre University — We have investigated the transition scenario to elastic turbulence for a semi-dilute solution of polyethylene oxide in the Couette-Taylor system with fixed outer cylinder. The control parameters are the Taylor number Ta, the elastic number E and the viscosity ratio $S = \eta_p/\eta_s$ [1,2]. The solution is shear-thinning i.e. the viscosity decreases as the strain increases. The first instability mode from the base flow appears as a pattern of counterpropagating waves with a strong interaction that leads to large second harmonics in space and in time. We have found two regions in the parameter space with different higher instability modes : for small values E, a small increase of Ta leads to a pattern dominated by spatiotemporal defects and holes, and a further increase of Ta leads to spatiotemporal intermittency with determined critical parameters. For intermediate values of E, the pattern bifurcates to a pattern formed by large counter-rotating vortices with a localized strong inflow but a weak outflow. These large vortices are have an irregular size is of about $5d$ where d is the gap size. These vortices have been previously observed in solutions with constant viscosity [3]. [1] S. Muller, E. Shaqfeh & R. Larson, J. Non-Newtonian Fluid Mech. **46**, 315(1993) [2] O. Crumeyrolle, I. Mutabazi & M. Grisel, *Phys. Fluids* **14**, 1681(2002) [3] A. Groisman & V. Steinberg, *Phys. Fluids* **10**, 2451(1998)

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