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Streak instability in viscoelastic Couette flow LUCA BIANCOFIORE, Imperial College London, LUCA BRANDT, KTH - Stockholm, TAMER ZAKI, John Hopkins University — The secondary instability of streaks and transition to turbulence in viscoelastic Couette flow are studied using direct numerical simulations (DNS). Viscoelasticity is modeled using the FENE-P constitutive equations, and both the polymer concentration and Weissenberg number are varied in order to assess their effect on transition at moderate Reynolds number, $Re = 400$.The base streaks are obtained from nonlinear simulations of the Couette flow response to a streamwise vortex, and can be classified as quasi-Newtonian streaks according to the terminology introduced by Page & Zaki (2014). At every streak amplitude of interest, harmonic forcing is introduced to trigger the secondary instability and breakdown to turbulence. The critical amplitude of this forcing decreases at higher Weissenberg number and also with increasing polymer concentration. The results demonstrate the destabilizing effect of elasticity at moderate Reynolds numbers.

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