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**Interfacial instability of wormlike micellar solutions sheared in a Taylor-Couette cell** HADI MOHAMMADIGOUSHKI, SUSAN J. MULLER, Chemical and Biomolecular Engineering-UC Berkeley — We report experiments on wormlike micellar solutions sheared in a custom-made Taylor-Couette (TC) cell. The computer controlled TC cell allows us to rotate both cylinders independently. Wormlike micellar solutions containing water, CTAB, and NaNo3 with different compositions are highly elastic and exhibit shear banding within a range of shear rate. We visualized the flow field in the $\theta$-z as well as r-z planes, using multiple cameras. When subject to low shear rates, the flow is stable and azimuthal, but becomes unstable above a certain threshold shear rate. This shear rate coincides with the onset of shear banding. Visualizing the $\theta$-z plane shows that this instability is characterized by stationary bands equally spaced in the z direction. Increasing the shear rate results to larger wave lengths. Above a critical shear rate, experiments reveal a chaotic behavior reminiscent of elastic turbulence. We also studied the effect of ramp speed on the onset of instability and report an acceleration below which the critical Weissenberg number for onset of instability is unaffected. Moreover, visualizations in the r-z direction reveals that the interface between the two bands undulates. The shear band evolves towards the outer cylinder upon increasing the shear rate, regardless of which cylinder is rotating.

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