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Microstructure change of shear-bands in concentric cylinder flow of wormlike miceller solutions observed by birefringence profile MASATOSHI ITO, YUMIKO YOSHITAKE, TSUTOMU TAKAHASHI, Nagaoka University of Technology — The shear-bands formation process of wormlike micellar solutions in start-up shear has been examined by flow-birefringence observation. A concentric cylinder flow cell is used as a platform to generate the start-up shear and a birefringence observation system using the crossed Nichol polarizes with a white light source is built on it together. In this system, the entire flow field along both radial and circumferential direction can be observed. The magnitude of the birefringence is evaluated by the hue profile calculated from the color profile. The orientation angle at each band is estimated by the extinction angle. CTAB/NaSal aqueous solutions were used as a test fluid and it is known that they generate the shear-induced structure (SIS) at a certain shear rate. The birefringence appears homogeneously in the entire area of the flow field at low shear rate. At a certain shear rate, a thin highly oriented band is generated near the driven wall. With increasing the shear rate, this band changes to the SIS state gradually. When the extreme shear-hardening phenomenon appears at start region of high shear rate flow, the birefringence changes to homogeneous. In this case, the stress-optical coefficient keeps a constant that is the almost same value at the low shear.

Yumiko Yoshitake
Nagaoka University of Technology

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