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Corner Flows of Suspensions of Rigid Rods in a Newtonian fluid: Flow-induced Orientation and Concentration Distribution

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Abstract: Distributions of fiber orientation and fiber concentration in fiber suspension flows through a slit channel were measured. The suspensions used were dilute and concentrated ones. The slit channel had abrupt expansion and crank shape geometries with six L-shape corners. To visualize fibers clearly, an index-of-refraction matching method was employed, and tracer fibers having birefringence were also suspended. Upstream of the L-shape corner, the preferred angle of fibers oriented along the flow direction and the degree of orientation distributed symmetrically with respect to the centerline of the channel. After flowing around the L-shape corner, the preferred angle kept alignment to the streamlines, however, the degree of orientation became asymmetric with respect to the centerline. The asymmetric distribution was observed more clearly for the concentrated suspension. Furthermore, the fiber concentration is uniform over a width of the channel except the region adjacent to the side wall in the concentrated suspension flow, while it has a maximum near the side wall in the dilute case.

Key Words: [Fiber suspension](#), [L-shape corner](#), [Fiber orientation](#), [Concentrated suspension](#)

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