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Viscous Beads on Thin Vertical Fiber

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A thick uniform viscous film of castor oil on a vertical wire is unstable and forms beads. The Reynolds number of the flow is very small, typically 0.01. The small marks on the ruler are 1 mm apart. As a fiber, nylon fishing line of radius 0.25 mm was used.

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Three distinct regimes of the flow were observed. The first regime is observed for relatively large flow rates. In this case, the drops are large and move rapidly. The film between the drops is relatively thick and practically uniform. In the second case, the drop train is periodic. This regime was observed in a relatively small range of flow rates. For small flow rates, the drops are substantially more separated in space, and the film between the large drops shows a growth of periodic disturbances. Large drops collide with growing lobes ahead of them, consume the lobes, and continue to move.