

Figure 1(a)

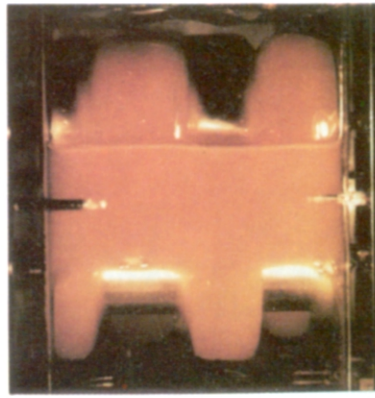


Figure 1(b)

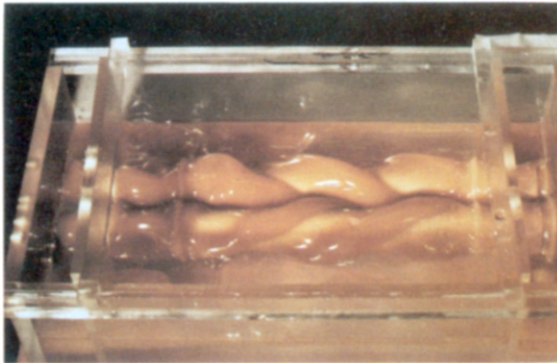


Figure 2

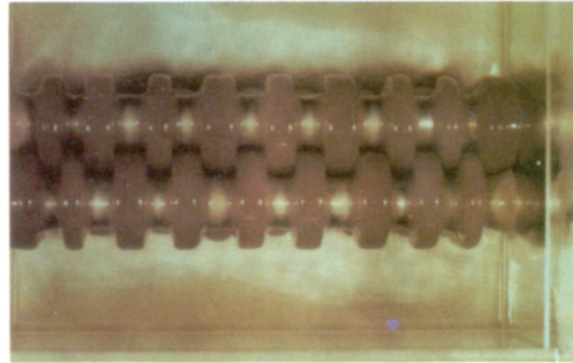


Figure 3

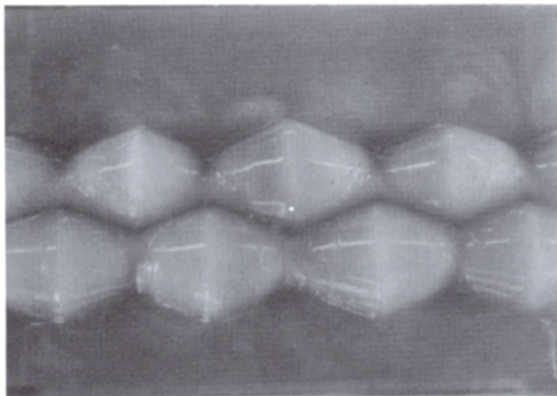


Figure 4

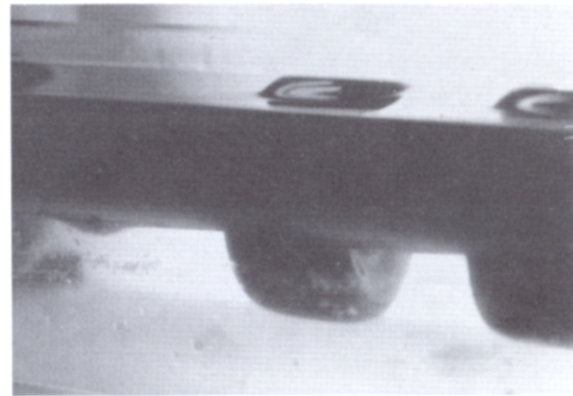


Figure 5

## ROLLERS

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High-viscosity liquids hate to work. Low-viscosity liquids are the victims of the laziness of high-viscosity liquids because they are easy to push around.

The arrangement of components in two-fluid flows is typically nonunique. There is a problem of places and a problem of shapes. The places occupied by the two fluids after the machinery is turned on have almost nothing to do with where the fluids were at rest. This problem seems to be associated with a kind of stability of lubricating flows associated with the viscosity difference. In the rotating-flow experiments we get lubrication through the formation of rollers

when the viscosity ratio is huge, and by sheet coating and emulsions for smaller viscosity ratios. The rollers form through fingering, which results in rotating rigid masses, lubricated on all sides by water. The shape of the rollers is determined in part by minimizing a potential involving centripetal acceleration and surface tension, subject to constraints. Figure 1 shows interpenetrating STP rollers in water (a) front view (b) side view; Fig. 2, "pretzels" on two cylinders; Fig. 3, rollers on two cylinders; Fig. 4, "diamonds" on two cylinders; Fig. 5, flat rollers on one cylinder.

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