Abstract Submitted
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Motion of a rigid sphere through an elastic tube with a lubrication film[1] MARIE TANI, Ochanomizu University and PMMH-ESPCI, PARISTECH, THOMAS CAMBAU, JOSE BICO, ETIENNE REYSSAT, PMMH-ESPCI, PARISTECH — The transport of soft objects through small rigid channels is a common problem in the biological world; red blood cells are deformed when passing through small capillaries and polymer coils can make their way through minute pores. We study the opposite model problem of a rigid sphere through a narrower elastic tube. The frictional force is measured while the sphere is pulled in the elastic tube at constant velocity. In addition to the dry case, we test the same system but we lubricate the sphere-tube contact with a viscous liquid. Friction generally decreases compared to the dry case owing to the lubrication film, but it depends on viscosity and velocity. As a result, geometry, mechanical properties of the tube, friction or lubrication mechanisms, and wetting properties determine the dynamics of the entrapped sphere. We present experimental results on this problem, together with scaling law analysis.

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