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THE CAPILLARY FLOW OF THE COLLOIDAL LIQUID IN THE ROUND CAPILLARY TUBE UNDER THE MICROGRAVITY CONDITION

Abstract

Liquid rising or falling within the capillary tube is the result of the surface tension, and the impetus roots in the pressure between the surfaces. We can study the capillary flows in different cross section shapes under microgravity condition by performing experiments in drop tower. The influence of contact angle and tube radius on the capillary-driven flow for tubes also can be discussed systematically without gravity. Experimental results show that the velocity of the capillary flow decreases monotonically with an increase in the contact angle. However, the capillary flow rate changes along with the tube radius. At the beginning of the microgravity period, the capillary flow in a thinner tube moves faster than that in a thicker tube and then the latter overtakes the former. Therefore, there is an intersection between the curves of meniscus velocity vs microgravity time for two differently sized tubes. For colloidal liquid, the viscosity, surface tension, contact angle are changed with the particle concentrations. We can observe the climbing height, the flow velocity, the volume flow rate, the fluid motion condition and so on under microgravity condition. And we try to find the physical law through the numerical solution and experiments.