

The effect of rheological properties of the PEO solution on the sessile drop oscillation during the early stage of elasto-capillary thinning transition

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The capillary break-up of an elastic fluid evolves through a series of sequential stages. Especially, the oscillation of sessile drop is generated at the transition from potential flow regime to elasto-capillary regime. A shape of oscillation with time shows a damped sinusoidal function whose amplitude approaches zero as the transition progresses. In an effort to define the mechanism and factor that affects the oscillation, the effect of rheological properties of the polymer on the oscillation of sessile drop has been experimentally studied. Dilute aqueous solutions of poly(ethylene oxide) of various concentrations and molecular weights (2×10^4 – 2×10^5) were used to achieve the variety in the viscosity and elasticity of the fluid. Frequency of oscillation and amplitude decay ratio were calculated from the measured heights of sessile drop. As a conclusion, the elasticity of polymer contributes to the generation of oscillation and we could control the oscillation by altering the elasticity of polymer chain.