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Effect of Amplitude on Frequency in Oscillating Liquid Drop SATOSHI MATSUMOTO, Japan Aerospace Exploration Agency, SHIGERU AWAZU, Tsukuba University, TAKEHIKO ISHIKAWA, SHINICHI YODA, Japan Aerospace Exploration Agency, TADASHI WATANABE, JAERI, YUTAKA ABE, Tsukuba University — Dynamics of a liquid drop oscillation by using the electrostatic levitation equipment was observed. A liquid drop with about 3 mm in diameter was levitated and was impressed external forces to oscillate the drop. The relationship between amplitude and shift of natural frequency was investigated. We report the behavior of levitating liquid drop up to nonlinear region. Especially, the axisymmetric oscillations with mode number 2 and the effect of the quantities of amplitude and the rotation were treated. The experimental data concerning the effect of frequency shift on amplitude agreed well with numerical simulation and theory up to non-dimensional amplitude, ε, 0.3. But the effect of frequency shift on amplitude disagreed in larger than non-dimensional amplitude of 0.3. It is assumed that the non-linearity comes from the internal flow and/or intense interfacial deformation. The frequency shift became larger with increasing the amplitude of oscillation. In case of rotating drop, the frequency shift becomes smaller than that of irrotational case. The frequency shift agreed well with theory in the rotational case.

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