

Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Analysis of Drop Oscillations Excited by an Electrical Point Force in AC EWOD JUNG MIN OH, SUNG HEE KO, KWAN HYOUNG KANG, Dept. of Mech. Eng., POSTECH, San 31, Hyoja-dong, Pohang, South Korea — Recently, a few researchers have reported the oscillation of a sessile drop in AC EWOD (electrowetting on dielectrics), and some of its consequences. The drop oscillation problem in AC EWOD is associated with various applications based on electrowetting such as LOC (lab-on-a-chip), liquid lens, and electronic display. However, no theoretical analysis of the problem has been attempted yet. In the present paper, we propose a theoretical model to analyze the oscillation by applying the conventional method to analyze the drop oscillation. The domain perturbation method is used to derive the shape mode equations under the assumptions of weak viscous flow and small deformation. The Maxwell stress is exerted on the three-phase contact line of the droplet like a point force. The force is regarded as a delta function, and is decomposed into the driving forces of each shape mode. The theoretical results on the shape and the frequency responses are compared with experiments, which shows a qualitative agreement.

Jung Min Oh
Dept. of Mech. Eng., POSTECH, San 31, Hyoja-dong, Pohang, South Korea

Date submitted: 02 Dec 2007

Electronic form version 1.4