

Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Prediction of Time Response of Electrowetting¹ SEUNG JUN LEE, JIWOO HONG, KWAN HYOUNG KANG, Pohang University of Science and Technology — It is very important to predict the time response of electrowetting-based devices, such as liquid lenses, reflective displays, and optical switches. We investigated the time response of electrowetting, based on an analytical and a numerical method, to find out characteristic scales and a scaling law for the switching time. For this, spreading process of a sessile droplet was analyzed based on the domain perturbation method. First, we considered the case of weakly viscous fluids. The analytical result for the spreading process was compared with experimental results, which showed very good agreement in overall time response. It was shown that the overall dynamics is governed by P2 shape mode. We derived characteristic scales combining the droplet volume, density, and surface tension. The overall dynamic process was scaled quite well by the scales. A scaling law was derived from the analytical solution and was verified experimentally. We also suggest a scaling law for highly viscous liquids, based on results of numerical analysis for the electrowetting-actuated spreading process.

¹This work was supported by the Korea Research Foundation Grant funded by the Korean Government (MOEHRD, Basic Research Promotion Fund) (KRF-2006-331-D00058).

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Date submitted: 11 Aug 2009

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