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Interfacial waves generated by contact line motion through electrowetting JONGHYUN HA, JAEBUM PARK, Seoul National University, YUNHEE KIM, JUNGMOK BAE, Samsung Advanced Institute of Technology, HOYOUNG KIM, Seoul National University — The contact angle of a liquid-fluid interface can be effectively modulated by EWOD (electrowetting on dielectric). Rapid movement of the contact line, which can be achieved by swift change of voltages at the electrodes, can give rise to interfacial waves under the strong influence of surface tension. Many optofluidic devices employing EWOD actuation, such as lenses, three-dimensional displays and laser radar, use two different liquids in a single cell, implying that the motions of the two liquids should be considered simultaneously to solve the dynamics of interfacial waves. Furthermore, the capillary waves excited by moving contact lines, which inherently involve slipping flows at solid boundaries, pose an interesting problem that has not been treated so far. We perform a perturbation analysis for this novel wave system to find the dispersion relation that relates the wavenumber, and the decay length over which the wave is dissipated by viscous effects. We experimentally corroborate our theory.

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