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Numerical simulation of the formation of liquid bridge with movable contact line by an external electric field JIN SEOK HONG, IN SEOK KANG, Chemical Engineering, Pohang University of Science and Technology, Korea — The authors have suggested a new dispensing method of droplets on demand, which is a counter-electrode-free electrohydrodynamic method with no pump and an inverted geometry; a top substrate and a bottom nozzle. Using this method, the authors have also demonstrated highly uniform dispensing results with a variance 1.8 % in droplet diameter. The dispensing process consists of two stages of liquid bridge (LB) formation by an applied electric pulse and its break-up by the movement of top plate. In this work, numerical simulation is performed for the first LB formation stage. The dynamics of liquid surface during LB formation is analyzed numerically for a simple liquid such as water. Especially, the movement of upper contact line is studied with respect to the dynamic contact angle model for the top plate. In addition, the asymmetry of the contact line mobility between nozzle and the top plate is also considered and its effect on the final upper contact area is analyzed. The numerical results are compared with the experimental results and discussed in terms of the effect of applied electric pulse.

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