

### Electrohydrodynamic behavior of the thin liquid film on the plane in case of no space charge

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The electrohydrodynamic behaviors of the thin liquid film have been investigated when we apply an electrostatic field above the thin film flow. The dimensionless governing equations and boundary conditions describing our system are derived by considering the physical configuration including a new aspect parameter  $\Theta$ . The approximate dynamic equations are obtained by applying the regular perturbation method into the liquid region including fluid velocity, pressure and electrostatic potential based on the thin film limits. For the numerical solutions of the final film evolution equation in case of  $1 > \Theta \gg \xi$ , the explicit method has been employed. The electrostatic potential distributions between the electrodes where thin liquid film and air are occupied are determined by using the finite element method (FEM).