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NUMERICAL SIMULATION OF ELECTROWETTING USING ELECTRIC BODY FORCE DENSITY AND SURFACE TENSION

ABSTRACT *The electrowetting is a phenomenon in which the shape of a droplet is deformed by external electric field. The most of electrowetting studies have been presented by researchers from the mechanical viewpoint. In this paper, we present a numerical method to calculate the droplet shape by taking into account the effects of external electric field, surface tension and gravity. The numerical analysis for shape calculation is formulated by using the equilibrium condition of hydrostatical pressure in the coupled system of external electric field and surface tension in the presence of gravity. The model is numerically implemented and coupled using a standard finite element procedure. The proposed method is numerically tested and validated in a shaping problem of water droplet placed above a conductor coated by dielectric material in external electric field. The electrowetting phenomenon was successfully modeled and analyzed by the proposed approach.*

Keywords: *simulation, force density, surface tension, electric field, gravity, modelling calculating, electrowetting, droplet shape, body force.*