

Abstract Submitted  
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**DNS of superimposed fluids under the action of DC electric field**

ALIREZA RAZEGHI, ASGHAR ESMAEELI, Southern Illinois University Carbondale — This study aims to explore the electrohydrodynamic-driven instability of the interface separating two horizontal immiscible liquid layers. The fluids are confined between two electrodes, where the light and less conducting liquid is overlaid on top of the heavy and more conducting one. Direct Numerical Simulations are performed using a front tracking/finite difference scheme in conjunction with Taylor-Melcher leaky dielectric model. The interface remains stable below a critical electric field strength and became unstable beyond it. For a sinusoidal initial perturbation, the instability leads to formation of a liquid column that penetrates from the lower fluid into the upper one. It is shown that the relative importance of the ratio of the electric conductivity and permittivity of the two fluids play a key role in determination of the shape of the columns and depending on this parameter, the liquid column may settle to an equilibrium height or continue to grow until its growth is limited by the upper wall. Examination of the structure of the flow field provides insight about the two observed behaviors.

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