Abstract Submitted
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Electrically driven flow and instability in a vertical Hele-Shaw geometry[1] THOMAS WARD[2], UCLA — The electrohydrostatic capillary flow of a viscous Newtonian fluid flowing between vertically oriented conducting parallel plates is studied both theoretically and experimentally. The dimensionless parameters governing the flow are the electric Bond and electric Reynolds numbers. At low electric Reynolds (< 1) and electric Bond numbers (< 1) the displaced fluid interface remains flat. At high electric Reynolds ($\gg 1$) and electric Bonds (> 1) numbers the interface develops a instability. The experimental results for the interface displacement as a function of time elapsed are compared with the theoretical predictions which are analogous to those derived by Washburn (1921) for the flow of a fluid in cylindrical capillaries. Despite the instability the theory and experiments for the trends in the static rise height show good agreement. The flow dynamics show similar trends to the theoretically predicted flow but deviate at higher electric Reynolds numbers due to a convective instability.

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