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Electrohydrodynamic instability in microchannels: time dependent forcing BRIAN STOREY, DAVID BOY, Olin College — The interaction of fluid electrical conductivity gradients and applied electric fields are known to be susceptible to electrohydrodynamic instabilities. In microfluidic applications, it has been shown that such instabilities can generate chaotic flows at low Reynolds number. This work considers stability in a flow channel with an electric field applied perpendicular to a diffuse interface of two fluids with different electrical conductivities. The applied electric field, which drives the instability, is taken to have both AC and DC components. The time dependent nature of the electric body force can have a stabilizing or destabilizing effect relative to the DC case. The linearized analysis is validated with direct numerical simulations.

Brian Storey
Olin College

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