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Effect of electric field on the linear stability characteristics of two-layer channel of Newtonian and Herschel-Bulkley fluids GAUTAM KUMAR, PURANAM ANANTH L NARAYANA, KIRTI SAHU, Indian Institute of Technology Hyderabad, India — We investigate the effect of electric field on the linear stability characteristics of pressure-driven flow in a channel, wherein a Newtonian fluid layer superposed on a layer of Herschel-Bulkley fluid. Both fluids are assumed to be incompressible and leaky dielectric media. The modified Orr-Sommerfeld eigenvalue equations are derived and solved using an efficient spectral collocation method. An asymptotic analysis is also performed in the long-wave limit. The effects of electric field, Bingham number, flow index and the ratios of density, viscosity, electrical conductivity and permittivity between the fluids are studied. We observed that the electric field can stabilize or destabilize the systems in different regimes.

Kirti Sahu
Indian Institute of Technology Hyderabad, India

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