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Electrostatically induced long-wave dynamics in moderately conducting annular flows[1] ALEX WRAY, DEMETRIOS PAPAGEORGIOU, OMAR MATAR, Imperial College London — Annular flows on both the inner and outer walls of cylinders have a significant number of practical applications; these range from printing to fluid stabilisation, to the augmentation of heat and mass transfer. It is important to understand the spatiotemporal dynamics of the interface in order to facilitate the possible control of the flow and efficiency of underlying processes. We investigate the evolution and stability of a viscous fluid layer wetting the surface of a cylinder and surrounded by a gas. The inner cylinder is an electrode kept at constant voltage. A second concentric electrode, whose potential is allowed to vary as a function of both space and time, encloses the system. This induces electrostatic forces at the interface in competition with surface tension and viscous stresses. Asymptotic methods are use to derive a long-wave system of evolution equations, valid for moderate conductivities. The resulting system is investigated both analytically and numerically via a systematic parametric study.

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