Abstract Submitted
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Numerical and analytical studies of the electric field effects on interfacial waves subject to Rayleigh-Taylor instability[1] LYUDMYLA BARANNYK, University of Idaho, DEMETRIOS PAPAGEORGIOU, Imperial College London, PETER PETROPOULOS, New Jersey Institute of Technology — A system of two stratified immiscible incompressible fluids in a horizontal channel of infinite extent is considered. Of particular interest is the case with the heavier fluid initially lying above the lighter fluid, so that the system is susceptible to the classical Rayleigh-Taylor instability. An electric field acting in the horizontal direction is imposed on the system and it is shown that it can act to completely suppress Rayleigh-Taylor instabilities and produces a dispersive regularization in the model. Dispersion relations are derived and a class of nonlinear traveling waves (periodic and solitary) is computed. Numerical solutions of the initial value problem of the system of model evolution equations that demonstrate a stabilization of Rayleigh-Taylor instability due to the electric field are presented. For weak electric fields, it is found that interface develops a finite-time singularity in the form of touchdown with the wall.

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