

عنوان مقاله:

Effect of Viscous Gas on Stability of the Electrified Liquid Sheet

محل انتشار:

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خلاصه مقاله:

An electrified liquid sheet was investigated by the linear analysis method. The sheet was injected into a dielectric viscous gas bounded by two horizontal parallel flat plates with a transverse electric field. To take into account the gas boundary layer thickness, the velocity profile of the liquid sheet must be considered and derived. By analyzing the liquid and gas domain, the relation between the growth rate and the wavenumbers for electrified liquid sheets was derived, and solved using the spectral method whose accuracy is higher than those of the finite element method and the finite difference method. Two modes, namely the sinuous mode and varicose mode were also investigated. The results revealed that the maximum growth rate of the sinuous disturbance wave is greater than that of the varicose one for the electrified liquid sheet. Moreover, the effects of the electrified Euler number and other parameters on the instability of the electrified liquid sheets have been tested. It is found that the growth rate is faster for an electrified liquid sheet than a non-electrified one. The electrical Euler number, the liquid Reynolds number, the Weber number and the momentum flux ratio can promote the breakup of a liquid sheet. However, the increase in the ratio I of the distance between the liquid sheet and flat plate to the liquid sheet thickness has an opposite influence with the other .parameters

کلمات کلیدی:

Electrified planar liquid sheet, Instability, Velocity profileSpectral methodLinear analysis

لینک ثابت مقاله در پایگاه سیویلیکا:





