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Effect of viscosity ratio on liquid-liquid jets subjected to radial/axial electric field SIDDHARTH GADKARI, IITB-Monash Research Academy, IIT Bombay, Powai, India, ROCHISH THAOKAR, Department of Chemical Engineering, IIT Bombay, Powai, India — Linear stability analysis for viscous liquid-liquid electrified jets subjected to axisymmetric (m=0) and asymmetric (m=1) perturbations has been performed. Both radial and axial electric field configurations are considered and the importance of viscosity ratio (λ= viscosity of surrounding fluid/Viscosity of inside fluid) is studied. λ is shown to have a damping effect on both the modes of perturbation. However the effect is more pronounced for the m=1 mode as compared to m=0 mode in the presence of electric fields. Viscosity ratio, along with electric field can control the dominance of individual modes. While m = 1 mode can only be realized in the lower λ limit when radial field is on, it is always possible to realize m = 1 mode under axial fields provided the threshold field is applied. A phase diagram showing predominance of the two modes at any given value of electric field and viscosity ratio is generated for both axial and radial electric field setups. This phase diagram can serve as a guideline for the required set of operating parameters in order to suppress/realize any desired mode of instability.

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