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**Electro-hydrodynamic Stability of Electrified Jet** - DHARMANSH, PARESH CHOKSHI, Indian Institute of Technology Delhi — The axisymmetric stability of the straight jet in electrospinning process is examined for both Newtonian and polymeric fluids using leaky dielectric model. Contrary to previous studies which consider cylindrical jet as the base-state, in the present study the thinning jet profile obtained as steady-state solution of the 1D model is considered as the base-state. The linear stability of the thinning jet is analyzed for axisymmetric disturbances, which are believed to be responsible for the bead formation. The growth rate eigen-specturm is constructed using Chebyshev collocation method. Two different types of axisymmetric instability modes are observed, the Rayleigh mode and the conducting mode. Competition between these two modes is revealed for the thinning jet. The most unstable growth rate for thinning jet is found to be significantly different from that for the uniform jet. The role of various material and process parameters is also investigated. For the viscoelastic fluids, the thinning jet with non-uniform extension rate captures the role of nonlinear rheology of fluid in the stability behavior. The viscoelastic jet profile obtained from steady-state 1D model is analyzed for stability. The role of fluid elasticity on various instability modes is studied. Interestingly, the strain hardening behavior in polymer solution tends to suppress the instability producing smooth fibers. Also, increasing the polymer concentration exhibits stabilizing effect on the axisymmetric instability modes.

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