Abstract Submitted
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The coiling of electrified liquid jets[1] JAVIER RIVERO RODRIGUEZ, MIGUEL PÉREZ-SABORID, Universidad de Sevilla — We have carried out a numerical study of the coiling regime which takes place when an electrified liquid jet issuing from an orifice drilled in a metal plate electrode reaches the counter electrode. Based on the slenderness assumption, we have derived the set of one-dimensional dynamical equations by averaging the underlying balance laws over the jet cross sections (Cosserat rod model). Therefore, our equations and boundary conditions are related to those obtained by N.M. Ribe (Ann. Rev Fluid Mech., 2012) for the coiling of liquid ropes, but including electrostatic effects. In a first approach, we have simplified the electrical terms entering the problem by assuming a constant external electric field between electrodes, and that the charges are convected by the jet surface interacting electrostatically with each other via the local interaction approximation (Yarin et al., 2001). We have numerically investigated the problem in order to analize how the coiling regime depends on the dimensionless parameters of the problem, i.e., the Reynolds number, the electrical Bond number and the capillary number. In particular, we have found that both the displacement of the centerline of the jet and its cross-sectional stretching greatly depend on the electrostatic effects.

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