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Electrohydrodynamic drop deformation by a strong electric field DOV RHODES, EHUD YARIV, Technion — Using matched asymptotic expansions within the Taylor-Melcher leaky-dielectric model, we analyze the strong deformation of a drop by a strong electric field. As is common in slender-body analyses, the small drop slenderness is used as the expansion parameter. This parameter however is not a priori specified in the problem formulation, and must be found throughout the course of the asymptotic solution. Sherwood's scaling for dielectric liquids, inverse with the 6/7-power of the electric field, applied here. Slender shapes are possible only for low drop viscosities. We identify a new inequality, in terms of materialproperty ratios, necessary for the evolution to a slender shape, which is independent of Taylor discriminating inequality, necessary for initial deviation to prolate shapes.

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