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Electro-deformation of a surfactant-laden viscous drop¹ HERVE NGANGUIA, YUAN-NAN YOUNG, New Jersey Institute of Technology, PETIA VLAHOVSKA, Brown University, JIA ZHANG, HAO LIN, Rutgers University — In this work we investigate the equilibrium shape and dynamics of a surfactant-laden viscous drop under an electric field. The full Taylor-Melcher leaky dielectric framework is employed. We use both small-deformation theory (for a drop slightly deformed from a spherical shape) and semi-decomposition method for a highly deformed (prolate or oblate) spheroidal drop. Both theoretical approaches are validated by comparing predicted deformation with experimental data by Ha and Yang (1998). The dependence of the critical Capillary number for the equilibrium shape on the surfactant coverage is quantified, and more detailed analysis of the models shed light on the surfactant effects on the drop deformation under an electric field.

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