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Dynamics of vesicles in electric fields PETIA VLAHOVSKA, Dartmouth College, RUBEN GRACIA, Max Planck Institute of Colloids and Interfaces — Electromechanical forces are widely used for cell manipulation. Knowledge of the physical mechanisms underlying the interaction of cells and external fields is essential for practical applications. Vesicles are model cells made of a lipid bilayer membrane. They are examples of "soft" particles, i.e., their shape when subjected to flow or electric field is not given a priori but it is governed by the balance of membrane, fluid and electrical stresses. This generic "softness" gives rise to a very complex vesicle dynamics in external fields. In an AC electric field, as the frequency is increased, vesicles filled with a fluid less conducting than the surrounding fluid undergo shape transition from prolate to oblate ellipsoids. The opposite effect is observed with drops. We present an electro- hydrodynamic theory based on the leaky dielectric model that quantitatively describes experimental observations. We compare drops and vesicles, and show how their distinct behavior stems from different interfacial properties.

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