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**Electrostatic line tension resulting from fluid-fluid interfacial deformation** AARON DOERR, STEFFEN HARDT, Institute of Nano- and Microfluidics, Tech. Univ. Darmstadt, Darmstadt, Germany — We investigate the deformation of a fluid-fluid interface due to osmotic and electrostatic forces in the three-phase contact region between an electrolyte, a non-polar fluid, and a dielectric solid substrate with both semi-analytical and numerical methods. It is shown that the interfacial deformation decays exponentially as a function of distance from the three-phase contact line, consistent with a well-defined macroscopic contact angle. As a consequence and on a sufficiently large scale of observation, the physical situation may be modeled by extrapolating the macroscopic interfacial shape to the solid substrate, while the energetic contributions associated with the microscopic configuration near the three-phase contact line may be accounted for by an excess energy per unit length of contact line, an electrostatic line tension. A comparison of the semi-analytical model to numerical calculations is used to examine its limits of quantitative applicability. At the same time, it is demonstrated that beyond those limits the model still qualitatively agrees with the numerical results, corroborating its usefulness for understanding the physics close to the three-phase contact line on large as well as on small observation length scales.

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