

Abstract Submitted  
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**Electrorotation of a viscous droplet in a uniform direct current electric field**<sup>1</sup> HUI HE, PAUL SALIPANTE, PETIA VLAHOVSKA, Brown University — We study both analytically and numerically the experimentally observed nonaxisymmetric droplet deformation and orientation in a uniform DC electric field [1]. The theoretical model shows that above a threshold electric field a rotational flow is induced about the droplet. As a result, drop shape becomes a general ellipsoid with major axis obliquely oriented to the applied field direction. The theory is in excellent agreement with the experimental data for high viscosity drops [2]. Low viscosity drops undergo significant deformation during rotation, which is captured by numerical simulations using the boundary integral method.

[1] Salipante and Vlahovska, *Physics of Fluids*, 22:112110 (2010)

[2] He, Salipante, and Vlahovska, *Physics of Fluids*, 25:032106 (2013)

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