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Rheological response of emulsions of drops immersed in electric fields. ARTURO FERNANDEZ, The Catholic University of America — Direct numerical simulation is used to examine the temporal response of an emulsion of drops immersed in an electric field. When a drop is immersed in a suspending fluid of different electrical properties, and an electric field is applied, surface electric charges accumulate on the boundary between drop and suspending fluid. These charges, coupled with an electric field, lead to the appearance of electric stresses at the interface between the fluids. When an emulsion is immersed between two plates moving at different velocities, the microstructure and rheological properties depend on the competition between electric and hydrodynamical forces. We present a study of these phenomena for DC and AC electric fields. The effect on microstructure is quantified by the PDF, and on rheological properties by effective viscosity and normal stress difference. The numerical simulations show that fluid shear, electrical properties of both fluids, frequency for an AC electric field, and intensity are the main parameters governing the response of the system.

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