

Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Direct Current Electrorheological Stability Determination of Water-in-Crude Oil Emulsions VLADIMIR ALVARADO, XIUYU WANG, University of Wyoming — Emulsion stability is a fundamental determination for separation technologies. We use the critical electric field (CEF) and viscosity changes in DC electrorheological (ER) experiments in dynamic mode to determine the stability of water-in-crude oil emulsions, previously studied through bottle tests. The CEF value corresponds to the value of electric field at which the current reaches 95% or larger of the plateau value. The results show that CEF can be consistently obtained through current measurements, resulting from emulsion structure breakdown. Viscosity changes are not good proxies of stability unless a robust emulsion structure is found. Emulsion structure breakdown is explored through rheological characterization before and after voltage sweeps have been performed. When the electric field applied is below the CEF value, the storage and loss moduli responses as well as viscosity as functions of frequency are recovered. However, when the electric field is greater than the CEF value, the emulsion structure breaks down irreversibly.

Vladimir Alvarado
University of Wyoming

Date submitted: 08 Aug 2009

Electronic form version 1.4