

Abstract Submitted  
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**Joule Heating Effects on Electrokinetic Flow Instabilities in Ferrofluids.**<sup>1</sup> CHRISTIAN BRUMME, RYAN SHAW, YILONG ZHOU, RAMA PRABHAKARAN, XIANGCHUN XUAN, Clemson University — We have demonstrated in our earlier work that the application of a tangential electric field can draw fluid instabilities at the interface of a ferrofluid/water co-flow. These electrokinetic flow instabilities are produced primarily by the mismatch of electric conductivities of the two fluids. We demonstrate in this talk that the Joule heating induced fluid temperature rises and gradients can significantly suppress the electrokinetic flow instabilities. We also develop a two-dimensional depth-averaged numerical model to predict the fluid temperature, flow and concentration fields in the two-fluid system with the goal to understand the Joule heating effects on electric field-driven ferrofluid flow instabilities.

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Xiangchun Xuan  
Clemson University

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