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A Modification of the Levich Model to Flux at a Rotating Disk in the presence of Planktonic Bacteria AKHENATON-ANDREW JONES, CULLEN BUIE, Massachusetts Inst of Tech-MIT — The Levich model of flow at a rotating disk describes convective mass transport to a disk when edge effects and wall effects can be neglected. It is used to interpret electrochemical reaction kinetics and electrochemical impedance of flow systems. The solution has been shown to be invalid for high densities ($\sim$ 1%v/v) of inert, non-motile nano-sized particles (<0.1 μm) and macro-particles (>1.5 μm), yet little work has been done for motile bacteria and bacterial sized particles. The influence of planktonic bacteria on rotating disk experiments is crucial for the evaluation of electrochemically active biofilms. In this work, we show that the presence of bacteria creates significant deviation from the ideal Levich model not shared by inert particles. We also study the impact of dead (fixed) bacteria on deviation form the Levich model. This work has implications for studies of microbial induced corrosion, microbial adhesion, and antibiotic transport to adhered biofilms preformed in rotating disk systems.

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