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Self-consistent nonlocal feedback theory for electrocatalytic swimmers[1] AMIR NOURHANI, VINCENT H. CRESPI, PAUL E. LAMMERT, Department of Physics, The Pennsylvania State University — The phoretic propulsion mechanisms of electrocatalytic micro/nano-motors has received considerably more theoretical attention than the heterogeneous electrochemical processes underlying their operation. We present a flexible approach to such heterogeneous electrochemistry with nonlocal feedback using a surface bias potential field as a control parameter field with a locally open-circuit reference state. The framing in operational terms permits both convenient contact to experiment and potential for implementation in Frumkin-Butler-Volmer kinetics. Previous results are recovered in a simple approximation, and an approximate scaling form is deduced for motor speed as function of fuel concentration and swimmer size which is more consistent with data from the literature than the original linear fits.

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