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Flow analysis of C. elegans swimming THOMAS MONTENEGRO-JOHNSON, University of Cambridge, DAVID GAGNON, PAULO ARRATIA, University of Pennsylvania, ERIC LAUGA, University of Cambridge — Improved understanding of microscopic swimming has the potential to impact numerous biomedical and industrial processes. A crucial means of analyzing these systems is through experimental observation of flow fields, from which it is important to be able to accurately deduce swimmer physics such as power consumption, drag forces, and efficiency. We examine the swimming of the nematode worm C. elegans, a model system for undulatory micro-propulsion. Using experimental data of swimmer geometry and kinematics, we employ the regularized stokeslet boundary element method to simulate the swimming of this worm outside the regime of slender-body theory. Simulated flow fields are then compared with experimentally extracted values confined to the swimmer beat plane, demonstrating good agreement. We finally address the question of how to estimate three-dimensional flow information from two-dimensional measurements.

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