Abstract Submitted
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Dynamics of swimmers in fluids with resistance[1] SARAH OLSON, Worcester Polytechnic Institute — Micro-swimmers such as spermatozoa are able to efficiently navigate through viscous fluids that contain a sparse network of fibers or other macromolecules. We utilize the Brinkman equation to capture the fluid dynamics of sparse and stationary obstacles that are represented via a single resistance parameter. The method of regularized Brinkmanlets is utilized to solve for the fluid flow and motion of the swimmer in 2-dimensions when assuming the flagellum (tail) propagates a curvature wave. For a single swimmer, we determine that increased swimming speed occurs for smaller cell body radius and smaller fluid resistance. Progression of swimmers exhibits complex dynamics when considering hydrodynamic interactions; attraction of two swimmers is a robust phenomenon for smaller beat amplitude of the tail and smaller fluid resistance. Wall attraction is also observed, with a longer time scale of wall attraction with larger resistance parameter.

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