Abstract Submitted
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Sperm navigation in complex environments[1] SARAH OLSON, Worcester Polytechnic Institute — Sperm can swim in a variety of environments, interacting with chemicals and other proteins in the fluid. Some of these extra proteins or cells may act as friction, possibly preventing or enhancing forward progression of swimmers. The homogenized fluid flow is assumed to be governed by the incompressible Brinkman equation, where a friction term with a resistance parameter represents a sparse array of obstacles. Representing the swimmers with a centerline approximation, we employ regularized fundamental solutions to investigate swimming speeds, trajectories, and interactions of swimmers. Asymmetric waveforms due to an increase in flagellar calcium is known to be important for sperm to reach and fertilize the egg. The trajectories of hyperactivated swimmers are found to have a decreased path curvature. Although attraction of two swimmers is more efficient in the Stokes regime, we find that attraction does not occur for larger resistance. Additionally, we study interactions of swimmers in a channel.

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