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Navigation and chemotaxis of nematodes in bulk and confined fluids[1] ALEJANDRO BILBAO, VENKAT PADMANABHAN, Texas Tech University, KENDRA RUMBAUGH, Texas Tech University Health Science Center, SIVA VANAPALLI, JERZY BLAWZDZIEWICZ, Texas Tech University — Small nematodes, such as the model organism *C. elegans*, propel themselves by producing sinuous undulations along the body and perform turns by varying the undulation amplitude. We have recently demonstrated [PLoS ONE 7(7) e40121 (2012)] that such motions can be accurately represented in terms of a piecewise-harmonic body curvature. We combine our harmonic-curvature description with highly accurate hydrodynamic bead-chain models to investigate the swimming efficiency and turning capabilities of the worm in bulk and confined fluids. Our results indicate that for the same change of the curvature-wave amplitude, a swimming nematode turns by a smaller angle compared to a crawling worm. The difference is due to rotational slip with respect to the surrounding medium, but the angles are sufficiently large to allow for efficient turning maneuvers. We use our description of nematode maneuverability to study chemotaxis in both confined and unconfined fluids.

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