Abstract Submitted
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Hook flexibility and body trajectories of swimming microorganisms[1] ZONGHAO ZOU, WILSON LOUGH, SAVERIO SPAGNOLIE, University of Wisconsin-Madison — The flexibility of the hook connecting the bacterial flagellum to the cell body, and an associated buckling instability, is believed to play an important role in microorganism locomotion. We consider a simplified model for the flagellum-cell dynamics and solve analytically for the flagellum orientation and cell trajectories through space. To better understand how hook flexibility affects the swimming pathway, we consider a sequence of problems, from fixed flagellar orientation, to specified orientation, to free, flexible motion dictated by force and torque balance. Exact helical trajectories yield to nearly-helical and then more complex paths. Other geometrical features are also explored, including baseline flagellum orientation. Numerical simulations reveal the regions of accuracy of our analytical predictions.

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