

Abstract Submitted
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Instabilities of a rotating helical rod YUNYOUNG PARK, Chung-Ang University, WILLIAM KO, University of Cincinnati, YONGSAM KIM, Chung-Ang University, SOOKKYUNG LIM, University of Cincinnati — Bacteria such as *Escherichia coli* and *Vibrio alginolyticus* have helical flagellar filament. By rotating a motor, which is located at the bottom end of the flagellar filament embedded in the cell body, CCW or CW, they swim forward or backward. We model a left-handed helix by the Kirchhoff rod theory and use regularized Stokes formulation to study an interaction between the surrounding fluid and the flagellar filament. We perform numerical studies focusing on relations between physical parameters and critical angular frequency of the motor, which separates overwhirling from twirling. We are also interested in the buckling instability of the hook, which is very flexible elastic rod. By measuring buckling angle, which is an angle between rotational axis and helical axis, we observe the effects of physical parameters on buckling of the hook.

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