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The dynamic instability in the hook/flagellum system that triggers bacterial flicks MEHDI JABBARZADEH, HENRY FU, University of Utah — Dynamical bending, buckling, and polymorphic transformations of the flagellum are known to affect bacterial motility, but run-reverse-flick motility of monotrichous bacteria also involves the even more flexible hook, which connects the flagellum to the cell body. Here, we identify the dynamic buckling mechanism that produces flicks in *Vibrio alginolyticus*. Estimates of forces and torques on the hook from experimental observations suggest that flicks are triggered at stresses below the hook's static Euler buckling criterion. Using an accurate linearization of the Kirchoff rod model for the hook in a model of a swimming bacterium with rigid flagellum, we show that as hook stiffness decreases there is a transition from on-axis flagellar rotation with small hook deflections to flagellar precession with large deflections. When flagellum flexibility is incorporated, the precession is disrupted by significant flagellar bending – *i.e.*, incipient flicks. The predicted onset of dynamic instabilities corresponds well with experimentally observed flick events.

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