

Abstract Submitted
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Motor Switching Rates in *Caulobacter Crescentus* Follow First Passage Time Distribution¹ JAY TANG, MICHAEL MORSE, JORDAN BELL, GUANGLAI LI, Brown University — The flagellar motor of uni-flagellated bacterium *Caulobacter crescentus* switches stochastically between clockwise (CW) and counterclockwise (CCW) rotation. We performed measurements of the time intervals between switches in order to gain insight on motor dynamics and regulation. Our measurements were performed both on free swimming cells and tethered cells with their flagella attached to a glass slide. A peak time of approximately one second was observed in both motor directions with counterclockwise intervals more sharply peaked. The distributions of switching times can be fitted using biased first passage time statistics. We present a model of motor switching dynamics, which is controlled by the binding of CheY-P to motor subunits FliM. A lower threshold number of FliM with CheY-P bound triggers a switch in motor rotation from CW to CCW, whereas a higher threshold triggers an opposing switch from CCW to CW. The time intervals between alternating switches may be increased or decreased by regulating CheY-P concentration, resulting in biased directional motion in the cells swimming trajectory over many motor cycles under external spatial or temporal gradients.

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