

Abstract Submitted
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Study of single flagellar propulsion with optical tweezers SUDHASHIL CHATTOPADHYAY, XIAO-LUN WU, University of Pittsburgh — Various theoretical models predict propulsion by the bacterial flagellum. Use of these models to calculate dynamical quantities of bacterial swimming are commonplace. However, direct verification of the various mathematical approaches has been difficult due to the lack of precise experimental data, which has been challenging to obtain. In this work we perform measurements on swimming bacterium which possess a single polar flagellum. Swimming with a single flagellum allows simpler parametrization as compared to a flagellar bundle. Bacteria are stably trapped in the bulk fluid (away from a surface) and perpendicular to the trapping axis with the aid of an imposed flow. This approach avoids hydrodynamic effects due to wall proximity, which were observed in previous measurements. The optical trap allows all dynamical quantities of a swimming bacterium to be determined. Flagellar dimensions are obtained by fluorescent imaging to obtain all pertinent information, required to put different theoretical models to test.

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