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Dynamics of flagellar bundling PIETER JANSSEN, MICHAEL GRAHAM, University of Wisconsin - Madison — Flagella are long thin appendages of microscopic organisms used for propulsion in low-Reynolds environments. For *E. coli* the flagella are driven by a molecular motor, which rotates the flagella in a counter-clockwise motion (CCM). When in a forward swimming motion, all flagella bundle up. If a motor reverses rotation direction, the flagella unbundle and the cell makes a tumbling motion. When all motors turn in the same CC direction again, the flagella bundle up, and forward swimming continues. To investigate the bundling, we consider two flexible helices next to each other, as well as several flagella attached to a spherical body. Each helix is modeled as several prolate spheroids connected at the tips by springs. For hydrodynamic interactions, we consider the flagella to made up of point forces, while the finite size of the body is incorporated via Faxén's laws. We show that synchronization occurs quickly relative to the bundling process. For flagella next to each other, the initial deflection is generated by rotlet interactions generated by the rotating helices. At longer times, simulations show the flagella only wrap once around each other, but only for flagella that are closer than about 4 helix radii. Finally, we show a run-and-tumble motion of the body with attached flagella.

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