Bacterial Motility in Confined Environments.

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Abstract: The ability of bacteria to swim through pores within soil or sediment that may be contaminated by oil is essential for their role in remediation. It is known that bacteria can move preferentially towards a chemoattractant by adjusting their run-and-tumble dynamics - the probability of their reorientation decreases as they move up the gradient. A tumbling event is characterized by a disruption of the flagellar bundle, where individual flagella may reverse their spin direction and move apart. We are interested in examining the dynamics of flagellar bundling within a pore whose diameter is on the scale of a flagellar length. As a step towards this goal, we consider a single elastic helical flagellum confined in a cylindrical tube. We examine its swimming performace when it is driven by an applied torque, balanced by an opposite torque on a virtual cell body. We also examine the trajectories of the swimmer when its axis is initially not parallel to the axis of the cylinder.

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