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Flagellar dependence of the directional persistence for bacterial run and tumble chemotaxis

Motivated by experimental data, we extend an existing individual based model for bacterial run and tumble chemotaxis to include the dependence of the directional persistence on the fraction of CW-rotating flagella. The model is built in two dimensional space for a fixed source of nutrient. We assume that the nutrient concentration has a Gaussian distribution profile. We measure the effect of flagellar cooperativeness on the chemotactic performance by the ability of the bacterium to reach a favourable region and to stay in that zone. Furthermore we analyse the effect of varying the directional persistence on the optimality of run and tumble chemotaxis and compare the obtained results with those found in other works.