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Impact of periodic reversals on bacterial protein exchange ABOUTALEB AMIRI, University of Notre Dame, Physics Department, AMY BUCHMANN, University of Notre Dame, Department of Applied Computational Mathematics and Statistics, JOSHUA SHROUT, University of Notre Dame, Department of Civil Engineering, MARK ALBER, University of Notre Dame, Department of Applied Computational Mathematics and Statistics — Collective motion has been observed in groups of many living organisms such as herd of birds, school of fish, swarms of insects and bacteria. Swarming behavior of the bacterium *Myxococcus xanthus* which is among the most social bacteria, will be discussed in this talk. Experimental observations suggest that *M. xanthus* bacteria share certain outer membrane proteins when they are in physical contact. The exchange of protein may help bacteria coordinate their swarming behavior in order to survive the harsh conditions or prey on other bacteria. Combination of computer simulations and cell tracking from experimental data is used to show that periodic reversals of direction of motion of individual bacterium at specific frequency is essential for the population to optimize exchange of the proteins. This model prediction is confirmed in experiment. The outer membrane proteins include those involved in bacterial motility system, and their efficient exchange promotes collective behavior of the cells and expansion rate of the population.

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