Enhancement of reactions by chemotaxis

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Chemotaxis plays a crucial role in a variety of processes in biology and ecology. Quite often it acts to improve efficiency of biological reactions. One example is reproduction, where eggs release chemicals that attract sperm. Another example are infected tissues secreting chemokines, attracting monocytes to fight invading bacteria. A macro-scale example is flower scent appealing to pollinator insects. I will describe recent research on modeling of these processes focusing on quantifying the role of chemotaxis. Analytical tools developed for this purpose include novel weak weighted Poincare inequalities and estimates on rates of convergence to ground state for a class of Fokker-Planck operators.

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