Mathematical Biology Seminar

Monday, March 18, 2019
3 pm – 457 CAB

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Reaction-diffusion and individual-based models for ant movement

We develop two distinct approaches to modeling, simulation, and mathematical analysis of ant movement. In the first approach, we consider a system of reaction-diffusion equations of chemotaxis type modeling ant foraging dynamics.We present a thorough mathematical analysis of the system. After discussing some limitations of the model, we present and discuss an individual based model for ant movement which takes into account the rules for individual response to pheromones. For this model, we present stability results for the underlying system of nonlocal ODEs, and discuss the emergence of collective behavior, including spontaneous trail formation.
This is joint work with R. Alonso, Th. Goudon and F. Peruani.