

SEMINÁRIO DE ANÁLISE E EQUAÇÕES DIFERENCIAIS

Dia 8 de Março (quinta-feira), às 13H30, na sala 6.2.33

Reaction-diffusion and individual-based models for ant movement

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Abstract

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. Although this model reproduces some observed behavior, such as concentration along trails, we argue that it is incomplete as a model of ant movement. Nonetheless, we present a thorough analysis of the system. In the second approach, 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 some stability results for the underlying system of nonlocal ODEs, and discuss the emergence of collective behavior, including spontaneous trail formation.

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