



The University of Western Ontario

Faculty of Science

Department of Applied Mathematics

APPLIED MATHEMATICS COLLOQUIUM

Date: Wednesday, March 19, 2008

Time: 2:30 pm

Location: Middlesex College Room 204

Sign of Wave Speed for Bistable Traveling Wave Solutions of a Competition Model

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Abstract:

The existence of traveling wave solutions, which describe the phenomenon of wave propagation or pattern formation, is common for the reaction-diffusion equations modeling many scientific problems in physics, biology and ecology. In this presentation we study the traveling waves for a two species Lotka – Volterra competition model. We are particular interested in the bistable case where, in the absence of population diffusion, the model has two stable steady states. For a bistable model, the existence of a bistable wave has been proved that provides a strong evidence to support the Principle of Competitive Exclusion in the ecology. However, the problem on the sign of wave speed for a bistable wave remains open. The sign of wave speed plays a very important role for a bistable model because it predicts which stable steady state is stronger, or which species has an advantage over another, when the inhomogeneous medium is considered. Although the sign of wave speed for a bistable wave can be determined for one - dimensional equations, no approach has been developed to study the sign of a bistable wave for a system. In this presentation we use a singular perturbation method, combined with a global continuation argument, to give a partition of the parameter space for which the corresponding system has the positive and negative wave speeds respectively, predicting which species will win the competition.