

Applied Dynamical Systems Seminar

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**Thursday, March 17, 24 and 31, 2016
12:00p.m.-1:00p.m., HH-3017**

Traveling Waves for Non-monotone Reaction–Diffusion Systems

Abstract:

In this series of three talks, I will report Dr. Wenzhang Huang's recent work on a geometric approach in the study of traveling waves for some classes of non-monotone reaction–diffusion systems [JDE, 260(2016), 2190-2224]. First, we develop a geometrical shooting argument, with the aid of the theorem of homotopy invariance on the fundamental group, to obtain the positive semi-traveling wave solutions for a large class of reaction–diffusion systems, including the models of predator–prey interaction (for both predator-independent/dependent functional responses), the models of combustion, Belousov–Zhabotinskii reaction, SI-type of disease transmission, and the model of biological flow reactor in chemostat. Next, we apply the obtained results to population models, such as the Beddington–DeAngelis model and the model of biological flow reactor, to show the convergence of these semi-traveling wave solutions to an interior equilibrium point by constructing a Lyapunov-type function, or the convergence of semi-traveling waves to another boundary equilibrium point by further analyzing the asymptotic behavior of semi-traveling wave solutions.