



复旦大学数学科学学院 数学综合报告会

报告题目: **Bounded Wave Solutions to Degenerate Parabolic Systems**

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摘要: The history of the theory of reaction-diffusion systems begins with the three famous works by Luther (1906), Fisher and Kolmogorov etc. (1937). Since these seminal papers much research has been carried out in an attempt to extend the original results to more complicated systems which arise in several fields. For example, in ecology and biology the early systematic treatment of dispersion models of biological populations [Skellam (1951)] assumed random movement. There the probability that an individual which at time $t = 0$ is at the point x_1 moves to the point x_2 in the interval of time Δt is the same as that of moving from x_2 to x_1 during the same time interval. On this basis the diffusion coefficient in the classical models of population dispersion appears as constant. In this talk, we introduce the Lie symmetry reduction method and apply it to study the case that some species migrate from densely populated areas into sparsely populated areas to avoid crowding. We consider a more general parabolic system by considering density-dependent dispersion as a regulatory mechanism of the cyclic changes. Here the probability that an animal moves from the point x_1 to x_2 depends on the density at x_1 . Under certain conditions, we apply the higher terms in the Taylor series and the center manifold method to obtain the local behavior around a non-hyperbolic point of codimension one in the phase plane, and use the Lie symmetry reduction method to explore bounded wave solutions.

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