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一类具有非局部扩散的时滞Lotka-Volterra竞争模型的行波解

夏静[1,2], 余志先[3], 袁荣[4]

1. 装甲兵工程学院基础部, 北京 100072;
2. 北京大学数学科学学院, 北京 100871;
3. 上海理工大学理学院, 上海 200093;
4. 北京师范大学数学科学学院, 北京 100875

Traveling Waves of a Competitive Lotka-Volterra Model with Nonlocal Diffusion and Time Delays

XIA Jing[1,2], YU Zhixian[3], YUAN Rong[4]

1. Department of Fundamental Courses, Academy of Armored Force Engineering , Beijing 100072;
2. School of Mathematical Sciences, Peking University, Beijing 100871;
3. College of Science, University of Shanghai for Science and Technology, Shanghai 200093;
4. School of Mathematical Sciences, Beijing Normal University, Beijing 100875

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摘要 本文研究一类具有非局部扩散的时滞Lotka-Volterra竞争模型

$$
\begin{cases}
\dfrac{\partial}{\partial t}u_1(x,t) = d_1\big[(J_1 * u_1)(x,t) - u_1(x,t)\big] \\
\qquad + r_1 u_1(x,t)\big[1 - a_1 u_1(x,t) - b_1 u_1(x,t-\tau_1) - c_1 u_2(x,t-\tau_2)\big], \\
\dfrac{\partial}{\partial t}u_2(x,t) = d_2\big[(J_2 * u_2)(x,t) - u_2(x,t)\big] \\
\qquad + r_2 u_2(x,t)\big[1 - a_2 u_2(x,t) - b_2 u_2(x,t-\tau_3) - c_2 u_1(x,t-\tau_4)\big]
\end{cases}
$$

行波解的存在性问题. 通过利用交叉迭代技巧, 我们可以把行波解的存在性转化为寻找一对适当的上下解,这篇文章中的结果推广了已有的一些结果.

关键词： Lotka-Volterra竞争模型　行波解　上下解　非局部扩散　时滞

Abstract： In this paper, we consider the existence of traveling waves for a competitive Lotka-Volterra model with nonlocal diffusion and time delays

$$
\begin{cases}
\dfrac{\partial}{\partial t}u_1(x,t) = d_1\big[(J_1 * u_1)(x,t) - u_1(x,t)\big] \\
\qquad + r_1 u_1(x,t)\big[1 - a_1 u_1(x,t) - b_1 u_1(x,t-\tau_1) - c_1 u_2(x,t-\tau_2)\big], \\
\dfrac{\partial}{\partial t}u_2(x,t) = d_2\big[(J_2 * u_2)(x,t) - u_2(x,t)\big] \\
\qquad + r_2 u_2(x,t)\big[1 - a_2 u_2(x,t) - b_2 u_2(x,t-\tau_3) - c_2 u_1(x,t-\tau_4)\big]
\end{cases}
$$

By a crossing interation technique, we reduce the existence of traveling waves to looking for a suitable upper-lower solutions. The result in the present paper extends some known results.

Key words： competitive Lotka-Volterra model　traveling wave　upper-lower solution　nonlocal diffusion　time delay

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