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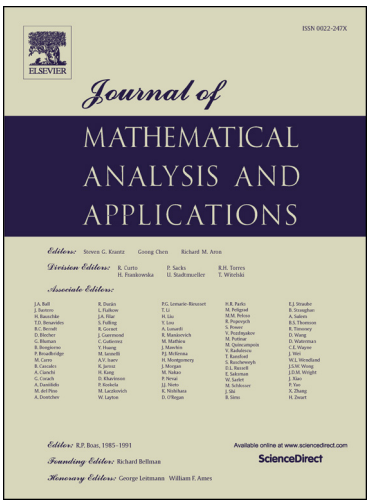

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The stability of traveling wave solutions for a diffusive competition system of three species☆

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Abstract

In this article, we investigate the stability of monotone traveling wave solutions for a diffusive three species competition system. By considering the initial perturbations of the traveling waves in some weighted function spaces, the monotone three-species waves become asymptotically stable. Further stability will be determined from the asymptotic behavior of the waves. This can be achieved by using the method of super- and subsolutions.

Keywords: Lotka-Volterra; competition-diffusion system; stability; traveling waves

2010 MSC: 35B35

1. Introduction

In this paper we consider the Lotka-Volterra competition-diffusion system

$$u_{i,t} = D_i u_{i,xx} + r_i u_i \left(1 - \sum_{j=1}^{n} b_{ij} u_j\right), \ x \in \mathbb{R}, t > 0, \ i = 1, ..., n, \qquad (1.1)$$

where D_i, r_i, b_{ij} $(i, j = 1, ..., n)$ are positive constants. This system has attracted much attention in ecological and biological areas. Traveling wave solutions of (1.1) play an important role in the biological invasion of species. The previous works on traveling waves for two species $(n = 2)$ can be found in [1], [2] and the reference therein. For the three species case $(n = 3)$, due to the lack of maximum

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