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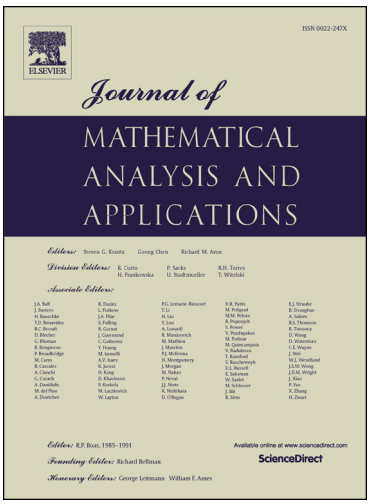

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Existence of positive solution for a system of elliptic equations via bifurcation theory

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Abstract

In this paper we study the existence of solution for the following class of elliptic systems

$$\begin{cases} -\Delta u = \left(a - \int_\Omega K(x,y) f(u,v)dy\right) u + bv, & \text{in} \quad \Omega \\ -\Delta v = \left(d - \int_\Omega \Gamma(x,y) g(u,v)dy\right) v + cu, & \text{in} \quad \Omega \\ u = v = 0, & \text{on} \quad \partial\Omega \end{cases} \tag{P}$$

where $\Omega \subset \mathbb{R}^N$ is a smooth bounded domain, $N \geq 1$, and $K, \Gamma : \Omega \times \Omega \to \mathbb{R}$ are nonnegative functions satisfying some hypotheses and $a, b, c, d \in \mathbb{R}$. The functions f and g satisfy some conditions which permit to use Bifurcation Theory to prove the existence of solution for (P).

Mathematics Subject Classifications: 35J15, 35J60, 92B05.

Keywords: Nonlocal logistic equations; A priori bounds; Positive solutions.

1 Introduction and main result

The main goal of this paper is to study the existence of positive solution for the following class of nonlocal problems

$$\begin{cases} -\Delta u = \left(a - \int_\Omega K(x,y) f(u,v)dy\right) u + bv, & \text{in} \quad \Omega \\ -\Delta v = \left(d - \int_\Omega \Gamma(x,y) g(u,v)dy\right) v + cu, & \text{in} \quad \Omega \\ u = v = 0, & \text{on} \quad \partial\Omega \end{cases} \tag{P}$$

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