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具II型Holling功能性反应强耦合椭圆系统共存问题

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摘要 本文研究带齐次Dirichlet边界条件的强耦合椭圆系统,

首先证明了当食饵和捕食者的扩散率足够大, 或者出生率足够小时,

系统不存在共存现象, 并给出半平凡解存在的充分条件.然后利用Schauder

不动点定理, 得到强耦合的椭圆问题至少有一个正解存在的充分条件.

该条件说明只要捕食者的内部竞争强, 物种的交叉扩散相对弱,

或者捕获率足够小,物种的交叉扩散相对弱,强耦合系统就至少有一个正解存在.

关键词 交叉扩散 自扩散 强耦合椭圆系统

分类号

Coexistence of a Strongly Coupled Elliptic System with Holling Type II Functional Response

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Abstract A strongly coupled elliptic system with homogeneous Dirichlet boundary conditions is considered. %The prior estimates for the solution of It is shown that there is no coexistence state if diffusion rates are strong, or if the intrinsic growth rates are slow. Making use of the Schauder fixed point theory, we derive some sufficient conditions to have a coexistence state for the strongly coupled elliptic problem. Moreover, our results reveal that this problem possesses at least one coexistence state if the intra-specific competition of predator is strong and cross-diffusions are relatively weak, or if the capturing rate is slow and cross-diffusions are relatively weak.

Key words cross-diffusion self-diffusion strongly coupled elliptic system

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