

Turing-Hopf bifurcation of a diffusive Holling-Tanner model with nonlocal effect and digestion time delay

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Abstract

In this paper, we discuss the Turing-Hopf bifurcation of a diffusive Holling-Tanner model with nonlocal effect and digestion time delay. The stability, Turing bifurcation, Hopf bifurcation and Turing-Hopf bifurcation are first researched. Then we derive the algorithm for calculating the normal form of Turing-Hopf bifurcation of a diffusive Holling-Tanner model with nonlocal effect and digestion time delay. At last, we carry out some numerical simulations to verify our theoretical analysis results. The stable positive constant steady state and the stable spatially inhomogeneous periodic solutions are found. Furthermore, the evolution process from unstable spatially inhomogeneous steady states to stable positive constant steady state, the evolution process from unstable spatially inhomogeneous steady states to stable spatially inhomogeneous periodic solutions, the evolution process from one unstable spatially inhomogeneous periodic solution to another stable spatially inhomogeneous periodic solution and the evolution process from unstable spatially inhomogeneous periodic solution to stable positive constant steady state are also found.

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