Global stability and Hopf bifurcation for Gause-type predator-prey system. (English)


Summary: A class of three-dimensional Gause-type predator-prey models is considered. Firstly, local stability of the equilibrium indicating the extinction of top-predator is obtained. Secondly, we analyze the stability of the coexisting equilibrium of the predator-prey system with time delay when the predator catches the prey of pregnancy or with growth time. The delay can lead to periodic solutions, which is consistent with the law of growth for birds and some mammals. Further, an explicit formula is given which determines the stability of the bifurcating periodic solutions theoretically and the existence of periodic solutions is displayed by numerical simulations.

MSC:
34K60 Qualitative investigation and simulation of models involving functional-differential equations
92D25 Population dynamics (general)
34C60 Qualitative investigation and simulation of ordinary differential equation models
34K18 Bifurcation theory of functional-differential equations
34K13 Periodic solutions to functional-differential equations

Full Text: DOI

References:


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