المستخلص بالإنجليزي

English Abstract

Stability and Oscillation of Predator-Prey Models

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Abstract

The Predator-Prey models is a biological models that has been showcased prominently by many scientists in recent times. The focus of this thesis is to display the origin of biological models for communities and individuals, as well as the formulation of the first mathematical model of Predator-Prey. The thesis is a compilation and summarization of the topic since its inception until this day. Additionally, the recent results on this subject have also been focused upon, which will serve as a basic building block for consultation or study and research on this subject. The study of Predator-Prey models with time delay has been discussed and the effects of time delay on the single population models has also been reviewed. The research also discusses predator- prey models with discrete time delay and also the general system which has various discrete time delays $\tau_{ij} = (i, j = 1,2,3, \dots, m)$ and its conditions for local and global stability by forming Liapunov function. Furthermore, the predator-prey models in the continuously distributed time delay has been dealt with, along with the local and global stability of the system (3.7.1). The effect of the dispersion on the predator-prey models and the effect of the dispersion of the preys' population between two environments on the stability of Lotka- Volterra Model are also discussed. The effect of delay and dispersion on the stability after applying the continuously distributed time delay to the same model are looked into and conditions to the global stability are found. finally, the effect of the stages structure on the predator -prey models, the effect of the stages structure on the prey, and the effect of time delay and stage structure on the predator are researched. It was proven that the local stability of the system contains the stage structure on the prey and the dispersion of the prey's population between two different environments by forming Liapunov function.