
Summary: In this paper we establish a time-delay predator-prey-environment model with stage structure of predator, impulsive harvesting of prey and impulsive input of pollutant in polluted environment. By using the stroboscopic mapping and the comparison principle of discrete dynamical systems, sufficient conditions for the global attractiveness of the predator extinction periodic solution and system persistence are obtained. Through numerical simulation, the effects of the prey capture, pulse input of pollutants and pulse action period on the extinction and survival of predators are studied, and the theoretical results are verified. This provides valuable theoretical basis for the development of biological resources, the harvest of population number and the control of environment.

MSC:
34K60 Qualitative investigation and simulation of models involving functional-differential equations
34K13 Periodic solutions to functional-differential equations
34K20 Stability theory of functional-differential equations
92D40 Ecology
34K45 Functional-differential equations with impulses
34K25 Asymptotic theory of functional-differential equations

Keywords:
impulsive harvesting; stage structure; pulse input of pollutant; predator-prey-environment model; extinction periodic solution; persistence

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