Stability analysis of predator - prey population model with time delay and constant rate of harvesting

Abstract

This paper studies the effect of time delay and harvesting on the dynamics of the predator - prey model with a time delay in the growth rate of the prey equation. The predator and prey are then harvested with constant rates. The constant rates may drive the model to one, two, or none positive equilibrium points. When there exist two positive equilibrium points, one of them is possibly stable. In the case of the constant rates are quite small and the equilibrium point is not stable, an asymptotically stable limit cycle occurs. The result showed that the time delay can induce instability of the stable equilibrium point, Hopf bifurcation and stability switches.