3736724 SCAM/M : MAJOR : APPLIED MATHEMATICS ; M.Sc. (APPLIED MATHEMATICS)
KEY WORD : PARASITIC INFECTION / PREDATOR-PREY SYSTEMS / LIMIT CYCLES / CHAOTIC BEHAVIOR

SAHATTAYA RATTANAMONGKONKUL : DYNAMIC BEHAVIOR OF A MODEL FOR THE EFFECT OF A PARASITE IN THE PREDATOR POPULATION OF A TWO SPECIES SYSTEM. THESIS ADVISOR : YONGWIMON LENBURY, Ph.D., I. MING TANG, Ph.D., NARDTIDA TUMRASVIN, M.S. 96 p. ISBN 974-589-470-2

Several extensive studies have been carried out to document the ability of parasites to alter the behavior of infected hosts (8-10). In this paper, we discuss the population dynamic consequences of parasite-induced changes in the behavior of the two interacting species in a predator-prey system, by means of the development and analysis of mathematical models. First, in order to investigate the dynamic consequences of the parasite-induced changes in the foraging ability of the predator population, a model is proposed for the predator-prey system in which only the predator population is invaded by a parasite. Thus, the predator population can be divided into two groups, namely the susceptible members and the infected ones. Analysis of the model is accomplished through a singular perturbation argument, whereby explicit conditions are derived which differentiate various dynamic behaviors and show the existence of limit cycles, explaining the oscillatory patterns often observed in field data. Parasite-induced changes in the prey's susceptibility to predation can also be modelled by a system of nonlinear differential equations (26) in which the prey population is divided into 2 groups, the susceptible members and the infectives, while the entire predator population is assumed to be infected with the parasite. Finally, an numerical investigation is carried out on the full 4-dimensional model in which both the prey and predator populations are divided each into an infected group and a susceptible one. Bifurcation diagram is constructed in order to identify the ranges of the system parametric values for which chaotic behavior can be expected.