HOPF BIFURCATION IN PREDATOR-PREY MODELS WITH AN AGE STRUCTURED PREY PROCEEDINGS*

MANUEL FALCONI

[1] *Departamento de Matemáticas, Facultad de Ciencias, UNAM,*
C. Universitaria, México, D.F. 04510.
E-mail: falconi@unam.mx

JAUME LLIBRE

Departament de Matemàtiques, Universitat Autònoma de Barcelona,
08193 Bellaterra, Barcelona, Catalonia, Spain,
E-mail: jllibre@mat.uab.cat

In this paper is analyzed the existence of periodic orbits in a predator-prey inter-
action, when the predator feeds on each one of the two age classes of the prey.
Three families of models are considered in correspondence with different prey and
predator behaviors. Specifically, a constant predation rate on the non reproductive
class of the prey is considered in the first family; a Holling predation of type two
on the non reproductive class is incorporated in the second and in the third fam-
ily; a defense group mechanism of the reproductive class is introduced in the third
family. We prove that these three families of models exhibit Hopf bifurcations and
the Hopf periodic orbit is a local attractor.

1. Introduction

Predator–prey is one of the most important interspecific interaction and it
has received extensive attention from many points of view. Recently some
models have been built to study the dynamical properties of a system where
predation is age–dependent. The study of age structured models is a topic
of ecological interest. In nature we find predators that eat only adults, or
immature prey, or sometimes they prefer the most conspicuous class. An
example is the cicada which is preyed only in adult stage [9], or some species
of perch which feed on immature prey [5]. The phenomenon of predation