Stability and Hopf Bifurcation in Predator-Prey Model with Modified Leslie-Gower and Beddington-DeAngelis Functional Response

Radouane Yafia[1], M.A. Aziz Alaoui[2]

[1] Université Ibn Zohr, Faculté Polydisciplinaire de Ouarzazate, B.P:638, Ouarzazate, Morocco
yafia1@yahoo.fr

[2] Laboratoire de Mathmatiques Appliques, 25 Rue Ph. Lebon, BP 540, 76058Le Havre Cedex, France
aziz.alaoui@univ-lehavre.fr

The model analyzed in this paper is based on the model set forth by M. A. Aziz Alaoui et al. [1, 4] with time delay, which describes the competition between the predator and prey. This model incorporates a modified version of Leslie-Gower functional response as well as that of the Beddington-DeAngelis. In this paper we consider the model with one delay and a unique non trivial equilibrium E^* and the three others are trivial. Their dynamics are studied in terms of the local and global stability and of the description of the Hopf bifurcation at E^* and at the third trivial equilibrium, that is proven to exists as the delay (taken as a parameter of bifurcation) crosses some critical values.

References

[1] M. A. Aziz-Alaoui and M. Daher Okiye, *Boundedness and global stability for a predator-prey model with modified Leslie-Gower and Holling-type II schemes*, Appl. Math. Lett. **16**, 2003, 1069–1075.

[2] J. K. Hale, *Theory of functional differential equations*, New York, Springer-Verlag, 1997.

[3] K. Gopalsamy, *Stability on the oscillations in delay differential equations of population dynamics*, Kluwer Academic, Dordrecht, 1992.

[4] A. F. Nindjin and M. A. Aziz-Alaoui and M. Cadivel, *Analysis of a a predator-prey model with modified Leslie-Gower and Holling-type II schemes with time delay*, Nonlinear Analysis, Real World Applications, **7** (5), 2006, 1104–1118.