JP Journal of Applied Mathematics

Volume 3, Issue 1, 2012, Pages 1-13

PERIODICITY IN A DELAYED KOLMOGOROV MUTUALISM MODEL ON TIME SCALES

Xiaoquan Ding and Dengya Guo

Abstract

This paper is devoted to a delayed Kolmogorov mutualism model on time scales. With the help of a continuation theorem based on coincidence degree theory, we establish easily verifiable criteria for the existence of periodic solutions. Some known results are shown to be special cases of the presented paper.

Keywords and phrases: mutualism model, periodic solution, time scale, delay, coincidence degree.

Received April 17, 2012

References

- X. Ding and J. Jiang, Positive periodic solutions for a generalized two-species semiratio-dependent predator-prey system in a two-patch environment, Math. Comput. Modell. 52 (2010), 361-369.
- [2] X. Tang and X. Zou, On positive periodic solutions of Lotka-Volterra competition systems with deviating arguments, Proc. Amer. Math. Soc. 134 (2006), 2967-2974.
- [3] X. Chen, Periodicity in a nonlinear discrete predator-prey system with state dependent delays, Nonlinear Anal. Real World Appl. 8 (2007), 435-446.
- [4] Y. Li, On a periodic mutualism model, Anziam J. 42 (2001), 569-580.
- [5] J. Huang, Positive periodic solution of a cooperative system, Chinese J. Engrg. Math. 18 (2001), 39-43.
- [6] Y. Li and G. Xu, Positive periodic solutions for an integrodifferential model of mutualism, Appl. Math. Lett. 14 (2001), 525-530.
- [7] Y. Li, Positive periodic solutions of a discrete mutualism model with time delays, Int. J. Math. Math. Sci. 4 (2005), 499-506.
- [8] L. Bai, M. Fan and K. Wang, Existence of positive periodic solution for difference equations of a cooperative system, Chinese J. Biomath. 19 (2004), 271-279.

- [9] M. Bohner and A. Peterson, Dynamic Equations on Time Scales: An Introduction with Applications, Birkhäuser, Boston, 2001.
- [10] M. Bohner and A. Peterson, Advances in Dynamic Equations on Time Scales, Birkhäuser, Boston, 2003.
- [11] V. Lakshmikantham, S. Sivasundaram and B. Kaymakcalan, Dynamic Systems on Measure Chains, Kluwer Academic Publishers, Dordrecht, 1996.
- [12] M. Bohner, M. Fan and J. Zhang, Existence of periodic solutions in predator-prey and competition dynamic systems, Nonlinear Anal. Real World Appl. 7 (2006), 1193-1204.
- [13] Y. Li and H. Zhang, Existence of periodic solutions for a periodic mutualism model on time scales, J. Math. Anal. Appl. 343 (2008), 818-825.
- [14] Z. Zeng, Periodic solutions for a delayed predator-prey system with stage-structured predator on time scales, Comput. Math. Appl. 61 (2011), 3181-3400.
- [15] X. Ding, J. Hao and C. Liu, Multiple periodic solutions for a delayed predator-prey system on time scales, World Acad. Sci. Eng. Technol. 60 (2011), 1532-1537.
- [16] R. E. Gaines and J. L. Mawhin, Coincidence Degree and Nonlinear Differential Equations, Springer-Verlag, Berlin, 1977.