

The evolution of periodic population systems under random environments

Du N.H., Kon R., Sato K., Takeuchi Y.

Faculty of Mathematics Mechanics and Informatics, Hanoi National University, 334 Nguyen Trai, Thanh Xuan, Hanoi, Viet Nam; Faculty of Mathematics, Kyushu University, Fukuoka 812-858, Japan; Department of Systems Engineering, Shizuoka University, Hamamatsu 432-8561, Japan

Abstract: In this paper we study the behavior of trajectories of the Lotka-Volterra competition system with periodic coefficients under telegraph noise. We give sufficient conditions for the average permanence. Furthermore, we determine the ??-limit sets of the system.

Author Keywords: Average permanence; Bistable; Competition; Lotka-Volterra equation; Telegraph noise

Year: 2005

Source title: Tohoku Mathematical Journal

Volume: 57

Issue: 4

Page : 447-468

Cited by: 2

Link: Scopus Link

Correspondence Address: Du, N.H.; Faculty of Mathematics Mechanics and Informatics, Hanoi National University, 334 Nguyen Trai, Thanh Xuan, Hanoi, Viet Nam

ISSN: 408735

DOI: 10.2748/tmj/1140727068

Language of Original Document: English

Abbreviated Source Title: Tohoku Mathematical Journal

Document Type: Article

Source: Scopus

Authors with affiliations:

1. Du, N.H., Faculty of Mathematics Mechanics and Informatics, Hanoi National University, 334 Nguyen Trai, Thanh Xuan, Hanoi, Viet Nam
2. Kon, R., Faculty of Mathematics, Kyushu University, Fukuoka 812-858, Japan
3. Sato, K., Department of Systems Engineering, Shizuoka University, Hamamatsu 432-8561, Japan
4. Takeuchi, Y., Department of Systems Engineering, Shizuoka University, Hamamatsu 432-8561, Japan

References:

1. Arnold, L., Random dynamical systems (1998) Springer Monogr. Math., , Springer, Berlin
2. Ahmad, S., Extinction of species in nonautonomous Lotka-Volterra systems (1999) Proc. Amer. Math. Soc., 127, pp. 2905-2910
3. Ahmad, S., On the nonautonomous Volterra-Lotka competition equations (1993) Proc. Amer. Math. Soc., 117, pp. 199-204
4. Chesson, P.L., Warner, R.R., Environmental variability promotes coexistence in lottery competitive systems (1981) Amer.

Natur., 117, pp. 923-943

5. Du, N.H., On the existence of bounded solutions for Lotka-Volterra equations (2000) Acta Math. Vietnam, 25, pp. 145-159
6. Du, N.H., Kon, R., Sato, K., Takeuchi, Y., Dynamical behavior of Lotka-Volterra competition systems: Nonautonomous bistable case and the effect of telegraph noise (2004) J. Comput. Appl. Math., 170, pp. 399-422
7. Farkas, M., Periodic motions (1994) Appl. Math. Sci., 104. , Springer, New York
8. Gihman, I.I., Skorohod, A.V., (1979) The Theory of Stochastic Processes III, , Springer-Verlag, Berlin-New York
9. Hanski, I., Turchin, P., Korpim??ki, E., Henttonen, H., Population oscillations of boreal rodents: Regulation by mustelid predators leads to chaos (1994) Nature, 364, pp. 232-235
10. Hofbauer, J., Sigmund, K., (1998) Evolutionary Games and Population Dynamics, , Cambridge University Press, Cambridge
11. Loreau, M., Coexistence of temporally segregated competitors in a cyclic environment (1989) Theoret. Population Biol., 36, pp. 181-201
12. Lipshter, R.S., Shyriaev, (1974) Statistics of Stochastic Processes, , Nauka, Moscow (in Russian)
13. Namba, T., Takahashi, S., Competitive coexistence in a seasonally fluctuating environment II. Multiple stable states and invasion success (1993) Theoret. Population Biol., 44, pp. 374-402
14. Takeuchi, Y., (1996) Global Dynamical Properties of Lotka-volterra Systems, , World Scientific Publishing Co., Inc., River Edge, N.J