Dynamical behavior of Lotka-Volterra competition systems: Non-autonomous bistable case and the effect of telegraph noise

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

Fac of Math Mechanics/Informatics, Hanoi National University, 334 Nguyen Trai, Thanh Xuan, Hanoi, Viet Nam; Department of Systems Engineering, Shizuoka University, Shizouka, Japan

Abstract: This article is concerned with the study of trajectory behavior of Lotka-Volterra competition bistable systems and systems with telegraph noises. We proved that for bistable systems, there exists a unique solution, bounded above and below by positive constants. The oscillatory situation of systems with telegraph noises is pointed out. ?? 2004 Elsevier B.V. All rights reserved.

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

Index Keywords: Computational methods; Oscillations; Spurious signal noise; Trajectories; Bistable systems; Telegraph noises; Telegraph; mathematical analysis

Year: 2004

Source title: Journal of Computational and Applied Mathematics

Volume: 171

Issue: 2-Jan

Page : 399-422

Cited by: 13

Link: Scorpus Link

Correspondence Address: Kon, R.; Department of Systems Engineering, Shizuoka University, Shizuoka, Japan; email: kon-r@math.club.ne.jp

ISSN: 3770427

DOI: 10.1016/j.cam.2004.02.001

Language of Original Document: English

Abbreviated Source Title: Journal of Computational and Applied Mathematics

Document Type: Article

Source: Scopus

Authors with affiliations:

1. Du, N.H., Fac of Math Mechanics/Informatics, Hanoi National University, 334 Nguyen Trai, Thanh Xuan, Hanoi, Viet Nam
2. Kon, R., Department of Systems Engineering, Shizuoka University, Shizouka, Japan
3. Sato, K., Department of Systems Engineering, Shizuoka University, Shizouka, Japan
4. Takeuchi, Y., Department of Systems Engineering, Shizuoka University, Shizouka, Japan

References:

1. Ahmad, S., On the nonautonomous Volterra-Lotka competition equations (1993) Proc. Amer. Math. Soc., 117, pp. 199-204
2. Ahmad, S., Extinction of species in nonautonomous Lotka-Volterra systems (1999) Proc. Amer. Math. Soc., 127, pp. 2905-2910

3. Huu Du Nguyen, On the Existence of Bounded Solutions for Lotka-Volterra Equations (2000) Acta Math. Vietnam., 25, pp. 145-159
4. Farkas, M., (1994) Periodic Motions, , Berlin: Springer
5. Freedman, H.I., Deterministic mathematical models in population ecology (1980) Monographs and Textbooks in Pure and Applied Mathematics, 57. , New York: Marcel Dekker, Inc
6. Furstenberg, H., Kifer, Y., Random matrix products and measures on projective spaces (1983) Israel J. Math., 21, pp. 12-32
7. Gihman, I.I., Skorohod, A.V., (1979) The Theory of Stochastic Processes, , Berlin, Heidelberg, New York: Springer
8. Gopalsamy, K., Global asymptotic stability in a periodic Lotka-Volterra system (1988) J. Austra. Math. Soc., 27, pp. 66-72. , Ser. B
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 Game and Population Dynamics, , Cambridge: Cambridge University Press
11. Takeuchi, Y., (1996) Global Dynamical Properties of Lotka-Volterra Systems, , Singapore: World Scientific