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.
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:

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

References:

- Ahmad, S., On the nonautonomous Volterra-Lotka competition equations (1993) Proc. Amer. Math. Soc., 117, pp. 199-204
- Ahmad, S., Extinction of species in nonautonomous Lotka-Volterra systems (1999) Proc. Amer. Math. Soc., 127, pp. 2905-2910
- Huu Du Nguyen, On the Existence of Bounded Solutions for Lotka-Volterra Equations (2000) Acta Math. Vietnam., 25, pp. 145-159

- Farkas, M., (1994) Periodic Motions, , Berlin: Springer
- Freedman, H.I., Deterministic mathematical models in population ecology (1980) Monographs and Textbooks in Pure and Applied Mathematics, 57. , New York: Marcel Dekker, Inc
- Furstenberg, H., Kifer, Y., Random matrix products and measures on projective spaces (1983) Israel J. Math., 21, pp. 12-32
- Gihman, I.I., Skorohod, A.V., (1979) The Theory of Stochastic Processes, , Berlin, Heidelberg, New York: Springer
- Gopalsamy, K., Global asymptotic stability in a periodic Lotka-Volterra system (1988) J. Austra. Math. Soc., 27, pp. 66-72. , Ser. B
- Hanski, I., Turchin, P., Korpimäki, E., Henttonen, H., Population oscillations of boreal rodents: Regulation by mustelid predators leads to chaos (1994) Nature, 364, pp. 232-235
- Hofbauer, J., Sigmund, K., (1998) Evolutionary Game and Population Dynamics, , Cambridge: Cambridge University Press
- Takeuchi, Y., (1996) Global Dynamical Properties of Lotka-Volterra Systems, , Singapore: World Scientific