Discussiones Mathematicae
Probability and Statistics 32 (2012) 17–18
doi:10.7151/dmps.1141

ASYMPTOTIC BEHAVIOUR IN THE SET OF NONHOMOGENEOUS CHAINS OF STOCHASTIC OPERATORS [1]

Małgorzata Pułka

Department of Mathematics
Gdańsk University of Technology
ul. Gabriela Narutowicza 11/12, 80-233, Gdańsk, Poland

e-mail: mpulka@mif.pg.gda.pl

Abstract

We study different types of asymptotic behaviour in the set of (infinite dimensional) nonhomogeneous chains of stochastic operators acting on $L^1(\mu)$ spaces. In order to examine its structure we consider different norm and strong operator topologies. To describe the nature of the set of nonhomogeneous chains of Markov operators with a particular limit behaviour we use the category theorem of Baire. We show that the geometric structure of the set of those stochastic operators which have asymptotically stationary density differs depending on the considered topologies.

Keywords: Markov operator, asymptotic stability, residuality, dense G_δ.

2010 Mathematics Subject Classification: Primary: 47A35, 47B65; Secondary: 60J10, 54H20.

References

[1] W. Bartoszek, *Asymptotic properties of the iterates of stochastic operators on (AL) Banach lattices*, Ann. Polon. Math. **52** (1990) 165–173.

[2] W. Bartoszek and B. Kuna, *On residualities in the set of Markov operators on* $\mathcal{C}_1$, Proc. Amer. Math. Soc. **133** (2005) 2119–2129. doi:10.1090/S0002-9939-05-07776-2

[1] This paper is a part of the author's Ph.D. thesis written under the supervision of Professor W. Bartoszek. The author wishes to express her appreciation to Professor Bartoszek for his advice and helpful suggestions.

[3] W. Bartoszek and M. Pułka, *On mixing in the class of quadratic stochastic operators*, submitted to Nonlinear Anal. Theory Methods Appl.

[4] S.R. Foguel, *More on the "zero-two" law*, Proc. Amer. Math. Soc **61** (1976) 262–264.

[5] U. Herkenrath, *On ergodic properties of inhomogeneous Markov processes*, Rev. Roumaine Math. Pures Appl. **43** (1998) 375–392.

[6] M. Iosifescu, *On two recent papers on ergodicity in nonhomogeneous Markov chains*, Annals Math. Stat. **43** (1972) 1732–1736. doi:10.1214/aoms/1177692411

[7] M. Iosifescu, Finite Markov Processes and Their Applications (John Wiley and Sons, 1980).

[8] D.L. Isaacson and R.W. Madsen, Markov Chains: Theory and Applications (Wiley, New York, 1976).

[9] A. Iwanik and R. Rębowski, *Structure of mixing and category of complete mixing for stochastic operators*, Ann. Polon. Math. **56** (1992) 233–242.

[10] S.P. Meyn and L.R. Tweedie, Markov Chains and Stochastic Stability (Springer, London, 1993). doi:10.1007/978-1-4471-3267-7

[11] F. Mukhamedov, *On L_1-weak ergodicity of nonhomogeneous discrete Markov processes and its applications*, Rev. Mat. Complut., in press. doi:10.1007/s13163-012-0096-9

[12] M. Pułka, *On the mixing property and the ergodic principle for nonhomogeneous Markov chains*, Linear Alg. Appl. **434** (2011) 1475–1488. doi:10.1016/j.laa.2010.11.021

[13] R. Rębowski, *Most Markov operators on $C(X)$ are quasi-compact and uniquely ergodic*, Colloq. Math. **52** (1987) 277–280.

Received 11 April 2012
Revised 23 February 2013