

Documents

Karim, S.N.^a, Hamzah, N.Z.A.^b, Rahman, N.H.A.^a, Zulkefli, M.F.^a, Ganikhodjaev, N.^c

Regularity of 2-partition Poisson quadratic stochastic operator with three different parameters

(2023) *AIP Conference Proceedings*, 2692, art. no. 020001, .

DOI: 10.1063/5.0124307

^a Department of Computational & Theoretical Science, Kulliyah of Science, International Islamic University Malaysia, Jalan Sultan Ahmad Shah, Bandar Indera Mahkota, Pahang, Kuantan, 25200, Malaysia

^b Dynamical Systems and Their Applications Unit, Kulliyah of Science, International Islamic University Malaysia, Jalan Sultan Ahmad Shah, Bandar Indera Mahkota, Pahang, Kuantan, 25200, Malaysia

^c Institute of Mathematics, Academy of Sciences of Uzbekistan, Tashkent, Uzbekistan

Abstract

Quadratic stochastic operator (QSO) was initiated by Bernstein in the early 20th century as the mathematical investigation on population genetics, involving the synthesis of Mendelian law of crossing and Galtonian law of regression. Since then, the study of QSO has been significantly developed for decades to describe dynamical systems in many areas. In this paper, we construct a Poisson quadratic stochastic operator generated by a 2-measurable partition with three different parameters defined on countable state space $X=\{0, 1, 2, \dots\}$. The main objective of this research is to study the trajectory behaviour of such operators by reducing the dynamical systems into a one-dimensional setting corresponding to the number of measurable partitions. Some cases of 2-measurable partition generated by singleton and two points with three different defined parameters will be presented. To investigate their trajectory behaviour, we may apply the functional analysis within the measure and probability theory. We shall provide both computational and analytical results, which show that the Poisson QSO generated by a 2-measurable partition with three different parameters, i.e., $\lambda_i \neq \lambda_j \neq \lambda_k$ is either a regular or nonregular transformation for some parameters $\lambda_i \in (0, \infty)$ for $i=1,2,3$. © 2023 Author(s).

References

- Bernstein, S.N.
(1924) *Uchn Zap. NI Kaf Ukr Otd Mat*, 1, pp. 83-115.
- Ganikhodjaev, R.N.
(1993) *Russ. Acad. Sci. Sb. Math*, 76, pp. 489-506.
- Ganikhodzhaev, R., Mukhamedov, F., Rozikov, U.
(2011) *Infin. Dimens. Anal. Quantum Probab. Relat. Top.*, 14 (2), pp. 279-335.
- Lyubich, Y.I.
(1992) *Mathematical Structures in Population Genetics*, Springer, Berlin
- Ganikhodzhaev, N.N., Zanin, D.V.
(2004) *Russ. Math. Surv.*, 59 (3), pp. 161-162.
- Mukhamedov, F., Saburov, M., Mohd Jamal, A.H.
(2012) *Int. J. Mod. Phys. Conf. Ser.*, 9, pp. 299-307.
- Mukhamedov, F., Qaralleh, I., Wan Rozali, W.N.F.A.
(2014) *Sains Malaysiana*, 43 (8), pp. 1275-1281.
- Mukhamedov, F., Embong, A.F.
(2015) *J. Inequalities Appl.*, 2015 (1).
- Saburov, M., Yusof, N.A.
(2018) *Methods Funct. Anal. Topol.*, 24 (3), pp. 255-264.
- Mukhamedov, F.
(2000) *Russ. Math. Surv.*, 55 (6), pp. 1161-1162.

- Ganikhodjaev, N., Hamzah, N.Z.A.
On Gaussian Nonlinear Transformations
(2015) *AIP Conference Proceedings*, 1682.
- Ganikhodjaev, N., Hamzah, N.Z.A.
Geometric quadratic stochastic operator on countable infinite set
(2015) *AIP Conference Proceedings*, 1643, pp. 706-712.
- Ganikhodjaev, N., Hamzah, N.Z.A.
(2014) *The Scientific World Journal*,
USA: Hindawi Publisher
- Ganikhodjaev, N., Hamzah, N.Z.A.
On Volterra quadratic stochastic operators with continual state space
(2015) *AIP Conference Proceedings*, 1660.
- Ganikhodjaev, N., Hamzah, N.Z.A.
(2017) *J. Phys. Conf. Ser.*, 819.
- Hamzah, N.Z.A., Ganikhodjaev, N.
On non-ergodic Gaussian quadratic stochastic operators
(2018) *AIP Conference Proceedings*, 1974.
- Ganikhodjaev, N., Hamzah, N.Z.A.
(2015) *Indian J. Sci. Technol.*, 8 (30).
- Ganikhodjaev, N., Muhitdinov, R., Saburov, M.
(2017) *Bull. Korean Math. Soc.*, 54 (2), pp. 607-618.
- Karim, S.N., Hamzah, N.Z.A., Ganikhodjaev, N.
(2019) *Malaysian J. Fundam. Appl. Sci.*, 15 (6), pp. 872-877.
- Karim, S.N., Hamzah, N.Z.A., Ganikhodjaev, N.
(2020) *Malaysian J. Fundam. Appl. Sci.*, 16 (3), pp. 281-285.
- Lyubich, Y.I.
(1974) *Mathematical Economics and Functional Analysis*, pp. 109-138.
in (Nauka, Moscow)

Correspondence Address

Hamzah N.Z.A.; Dynamical Systems and Their Applications Unit, Jalan Sultan Ahmad Shah, Bandar Indera Mahkota, Pahang, Malaysia; email: zatulakmar@iium.edu.my

Editors: Darnis D.S., Rozali W.N.F.A.W., Bahaludin H., Othman S.F.C., Ahmad N., Zakaria S.F.

Publisher: American Institute of Physics Inc.

Conference name: 7th International Conference on Advancement in Science and Technology 2021, iCAST 2021

Conference date: 24 August 2021 through 26 August 2021

Conference code: 188914

ISSN: 0094243X

ISBN: 9780735442955

Language of Original Document: English

Abbreviated Source Title: AIP Conf. Proc.

2-s2.0-85161724657

Document Type: Conference Paper

Publication Stage: Final

Source: Scopus