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Título: Normal deviation of Gamma Processes in Semi-Markov Random Media

Conferenciante: Nikolaos Limnios. Université de Technologie de Compiègne, Sorbonne University Alliance (France).



Abstract:

Normal deviation of Gamma Processes in Semi-Markov Random Media

Gamma processes are a special case of subordinators (increasing Lévy processes). Their increasing nature makes them particularly well-suited for modeling risk insurance problems of cumulative claims (see, for example, [1]), monotonic degradation (see, for example, [2]), and so on. In the latter reference, the authors use the gamma process to model cumulative claims in risk processes. They also tabulated the probabilities of ruin for the standardized gamma process.

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This presentation follows on from article [3]. We consider gamma processes in random media (environment) represented by semi-Markovian processes. We approximate these gamma processes using diffusion processes. We first obtain an average result, which will serve as an equilibrium, and then the diffusion approximation. This is a diffusion approximation with equilibrium or normal deviation of the gamma process in semi-Markovian random media. The tools used here differ from those employed in the case of Markov (see a previous article by the first author [4]) because we do not have semigroups. Applications are also discussed.

References :

[1] Dufresne F, Gerber HU, Shiu ESW (1991) Risk Theory with the Gamma Process. Austin Bulletin 21(2):177–192

[2] Singpurwalla ND (1995) Survival in dynamic environments. Stat Sci 10:86–103

[3] N. Limnios, F. Fourati, Diffusion Approximation of Gamma Processes in Semi-Markov Random Media, Methodol Comput Appl Probab (2026) 28:4 https://doi.org/10.1007/s11009-025-10237-8.

[4] Limnios N (2024) Normal deviation of gamma processes in random environment and applications. Appl Stoch Models in Bus Ind 41(1):e2929. https://doi.org/10.1002/asmb.2929

Short Biography:

Nikolaos Limnios, is an Emeritus Professor (Exceptional class Full Professor) at University of Technology of Compiègne (UTC) Sorbonne University, and former Director of the Laboratory of Applied Mathematics. He has obtained his diploma in 1979 at AUTh Greece, PhD in 1983, and Dr of Sciences (Doctorat d'Etat) in 1991 at UTC France. In 1988 he was appointed assistant professor (Maitre de conferences), and in 1993 a Professor at UTC in the Laboratory of Applied Mathematics. His research interest include stochastic processes and statistics with applications in biostatistics, in reliability/maintenance, statistical seismology, stochastic mechanics, etc. He is the Editor-in-Chief of book series “Mathematics and Statistics” in iSTE with J. Wiley. He has published more than 150 journal papers and about 15 books on theory and applications of stochastic processes and statistics; including the books: Semi-Markov chains and hidden semi-Markov Chains toward applications, Springer, 2008 (with V. S. Barbu); Stochastic Systems in Merging Phase Space, World Scientific, 2005 (with V. S. Koroliuk); Semi-Markov Processes and Reliability, Birkhauser, 2001 (with G. Oprisan)

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