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A Journey in the World of Stochastic Processes

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Abstract

This paper presents a survey of research results obtained by the author and his collaborators in the areas of limit theorems for Markov-type processes and randomly stopped stochastic processes, renewal theory and ergodic theorems for perturbed stochastic processes, quasi-stationary distributions for perturbed stochastic systems, methods of stochastic approximation for price processes, asymptotic expansions for nonlinearly perturbed semi-Markov processes and applications of the above results to queuing systems, reliability models, stochastic networks, bio-stochastic systems, perturbed risk processes, and American-type options.

Key words: Stochastic process, Randomly stopped stochastic process, Perturbed stochastic process, Random walk, Markov chain, Lévy process, Markov process, Diffusion process, Renewal process, Generalised exceeding process, Regenerative process, Semi-Markov process, Stochastic process with semi-Markov modulation, Price process, Modulated log-price process, Risk process, Weak convergence limit theorem, Necessary and sufficient condition, U-topology, Skorokhod J-topology, Functional limit theorem, Ergodic theorem, Perturbed renewal equation, Renewal theorem, Coupling, Quasi-stationary distribution, Stochastic approximation, Nonlinear perturbation, Singular perturbation, Asymptotic expansion, Queuing system, Reliability model, Stochastic network, Bio-stochastic system, Ruin probability, American-type option.

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