Asymptotic Expansions for Power-Exponential Moments of Hitting Times for Nonlinearly Perturbed Semi-Markov Processes

Dmitrii Silvestrov[1] and Sergei Silvestrov[2]

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Abstract

New algorithms for computing asymptotic expansions for exponential and mixed power-exponential moments of hitting times for nonlinearly perturbed semi-Markov processes are presented. The algorithms are based on special techniques of sequential phase space reduction and some kind of operational calculus for Laurent asymptotic expansions applied to moments of hitting times for perturbed semi-Markov processes. These algorithms have a universal character. They can be applied to nonlinearly perturbed semi-Markov processes with an arbitrary asymptotic communicative structure of the phase space. Asymptotic expansions are given in two forms, without and with explicit bounds for remainders. The algorithms are computationally effective, due to a recurrent character of the corresponding computational procedures.

Key words: Semi-Markov process, Nonlinear perturbation, Hitting time, Power-exponential moment, Laurent asymptotic expansion.

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[1]Department of Mathematics, Stockholm University, 106 91, Stockholm, Sweden, E-mail: silvestrov@math.su.se

[2]Division of Applied Mathematics, Mälardalen University, 721 23 Västerås, Sweden E-mail: sergei.silvestrov@mdh.se