

Nonlinearly Perturbed Renewal Equation with Perturbations of a Non-polynomial Type

Ying Ni

*Division of Applied Mathematics
School of Education, Culture and Communication
Mälardalen University, Västerås, Sweden
E-mail: ying.ni@mdh.se*

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The object of study is a model of nonlinearly perturbed continuous-time renewal equation with perturbations of a non-polynomial type. More specifically, the characteristics of the distribution generating the renewal equation are assumed to have expansions in the perturbation parameter with respect to a non-standard non-polynomial asymptotic sequence which can be considered as a generalization of the standard polynomial asymptotic sequence. Exponential asymptotics for such a model are obtained and the results are applied to a nonlinearly perturbed risk process with either exponential or gamma claim amounts and to a perturbed M/G/1 queuing system with gamma-distributed service time.