

ASYMPTOTIC EXPANSIONS FOR PERTURBED DISCRETE TIME REGENERATIVE PROCESSES

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We consider non-linearly perturbed discrete time regenerative processes with regenerative stopping times. Typically, the stopping time is the first hitting time into some measurable set and the behaviour of the process prior to this event is often a question of interest. Many results for this in the continuous time case are collected in Gyllenberg and Silvestrov (2008). Some results for the discrete time case can be found in Silvestrov and Petersson (2013) and Petersson (2013). In this talk we show how the quasi-stationary distribution for a perturbed discrete regenerative processes can be expanded in a power series with respect to the perturbation parameter under some conditions on the mixed power-exponential moments of the regeneration times. We also discuss how this theory can be applied for perturbed discrete time Markov chains.

Keywords: Regenerative process, Markov chain, Renewal equation, Perturbation, Quasi-stationary distribution, Asymptotic expansion.

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