On polynomial convergence rate for distribution of one non-regenerative reliability system with switching delay

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Previously, the rate of convergence of the distribution of the warm standby reliability system in the case when the repair and failure intensities are in a positive interval was studied by the author ("A System with Warm Standby" / Computer Networks (Proceedings of the 26th International Conference (CN 2019, Kamieé Śl(a)ski, Poland). Cham: Springer, 2019. P. 387-399). In the cited paper, we have assumed that the behaviour (failure and repair intensity) of both elements of this warm standby reliability system depends on the status of both elements. Under the status of an item, we mean the mode (repair or work) and the elapsed time to be in that mode.

We now propose a scheme for the calculation of the upper polynomial bound for the convergence rate of the system distribution in the following case:

- work-repair-work switching modes have a random and limited time;
- the intensity of the work-repair-work switching modes is limited from below by a function with given properties;
- the intensity of switching-repair-work is limited by some generalized function;
- again, we assume that the behaviour (intensity of failures and repairs, and switching times) of the two elements of considered warm standby reliability system depends on the status of both elements.

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The convergence of the Markov process describing the behaviour of the considered reliability system is studied. The ergodicity of this Markov process under the proposed conditions is demonstrated. An upper bound is obtained for the rate of convergence of this process in the total variation metric. The proposed construction relies on the generalized Lorden's inequality for quasi-renewal processes (https://arxiv.org/abs/1910.03381) and the use of the concept of quasi-regenerative processes.