Kocheganova (Rachinskaya) M. A. (Nizhni Novgorod, Russia) — **Limit theorems for a multidimensional Markov chain as a model of a queueing system controlled with a threshold-priority algorithm with prolongations.**

Consider a controlled queueing system with $m \geq 2$ conflicting input flows. The first flow has the highest priority of customers, while the flow with the number m has the biggest intensity. The problem statement can be found in [1]. A multidimensional Markov sequence $\{(\Gamma_i, æ_{1,i}, æ_{m,i}, \xi'_{1,i-1}, \xi'_{m,i-1}), i \in I\}$ along with recurrent relations $\Gamma_{i+1} = u(\Gamma_i, æ_{1,i}, \eta_{1,i})$, $æ_{j,i+1} = \max\{0, æ_{j,i} + \eta_{j,i} - \xi_{j,i}\}$ and $\xi'_{j,i} = \min\{æ_{j,i} + \eta_{j,i}, \xi_{j,i}\}$, $j = 1, 2$, is a mathematical model of the system. Here $\{\tau_i; i = 0, 1, \ldots\}$ denotes a time scale. The following random variables and elements are also introduced: 1) Γ_i — random state of the server at the time interval $[\tau_i, \tau_{i+1})$, 2) $\eta_{j,i}$ — number of arrivals for the j-th flow during period $[\tau_i, \tau_{i+1})$, 3) $\xi_{j,i}$ and $\xi'_{j,i}$ — maximal and real number of served customers for the j-th flow during period $[\tau_i, \tau_{i+1})$, 4) $æ_{j,i}$ — number of waiting customers of the j-th flow at the moment τ_i. The function $u(\cdot, \cdot, \cdot)$ describes the control algorithm with prolongations and threshold priority. The given algorithm implements a feedback based on a number of waiting customers of the high-priority flow. An ergodic theorem for the Markov chain is proved (see [1]). Based on this result, the necessary and sufficient conditions of stationary chain distribution existence are formulated. These conditions are derived with the help of iterative-majorant method [2].

REFERENCES

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