

Pechersky E. A. (Moscow, Russia) — **Large Deviations for a class of Markov Processes.**

The main object of the investigations is continuous-time Markov processes taking their values in $\mathcal{N} \times \mathbb{Z}_+^d$, where $\mathcal{N} = \{0, 1, \dots, N\}$ and $d \in \mathbb{N}$. Let $\zeta = (\xi, \eta_1, \dots, \eta_d)$ be such process. The transition probabilities are defined by the generator \mathbf{L} , acting on the functions $g : \mathcal{N} \times \mathbb{Z}_+^d \rightarrow \mathbb{R}$. The generator \mathbf{L} depends on positive reals $\lambda, \mu_1, \dots, \mu_d$ and triplets $(k_i, r_i, s_i), i = 1, \dots, d$ of integers such that the triplets are distinguished for different i and $k_i \geq r_i \geq s_i \geq 1$. Then the generator of ζ is

$$\begin{aligned} \mathbf{L}g(m, \ell_1, \dots, \ell_d) &= \lambda(N - m)[g(m + 1, \ell_1, \dots, \ell_d) - g(m, \ell_1, \dots, \ell_d)] \\ &+ \sum_{i=1}^d \mu_i \pi_i(m) [g(m - s_i, \ell_1, \dots, \ell_i + s_i, \dots, \ell_d) - g(m, \ell_1, \dots, \ell_d)], \end{aligned} \quad (1)$$

where $\pi_i(m) = \binom{m}{r_i} \binom{N-m}{k_i-r_i}$.

We consider the mean field theory.

We study the large deviations of ζ on the path level. The process ζ we consider on the time-interval $[0, T]$. The main interest for us a behaviour of some functional of the process paths when $N \rightarrow \infty$. In particular we study the function

$$\hat{x}(t) = \lim_{N \rightarrow \infty} \mathbb{E} \left(\frac{1}{N} \xi(t) / \frac{1}{N} \sum_{i=1}^d \eta_i(T) > B \right).$$

Теорема

There exists $i_0 \in \{1, \dots, d\}$ independent on the parameters defining the process ζ such that

$$\lim_{B \rightarrow \infty} \hat{x}(t) \equiv \frac{r_{i_0}}{k_{i_0} + s_{i_0}} \quad (2)$$

on the open interval $(0, T)$.

One result in this irection was published in [1], where we studied the case $d = 1$ and the triple $(1, 1, 1)$. In this case the limit (2) is equal to $\frac{1}{2}$.

REFERENCES

1. Pechersky, E., Pirogov, S., Schütz, G. M., Vladimirov, A. and Yambartsev, A. (2017). Large Fluctuations of Radiation in Stochastically Activated Two-Level Systems. Journal of Physics A: Mathematical and Theoretical, 50, 45, 455203

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