N. Ratanov (Chelyabinsk State University). **Piecewise deterministic Markov process with two-well potential. Again about stochastic resonance [1].**

We study the one-dimensional stochastic process $X = X(t)$ determined by the equation

$$\mathrm{d}X(t) = -U_0'(X(t))\mathrm{d}t + \mathrm{d}\mathbb{T}(t), \qquad t > 0.$$

Here $U_0 = U_0(x)$ is a two-well potential with two local minima at ± 1 and a local maximum at 0, $\mathbb{T}(t)$ is the telegraph process, $\mathbb{T}(t) = \int_0^t c_{\xi(s)}\mathrm{d}s$, with sufficiently small c_0 and c_1, $c_0 > c_1$, such that $U(x) - c_0 x$ and $U(x) - c_1 x$ still a two-well potential. Here $\xi = \xi(t) \in \{0, 1\}$ is a two-state Markov process with alternating switching intensities λ_0, λ_1.

Theorem. *There are two invariant measures μ_- and μ_+ supported on the attracting intervals $G_- = (a_-, b_-)$ and $G_+ = (a_+, b_+)$. The invariant densities has the form*

$$\pi_0^{\pm}(x) = C_0 \frac{\Psi(x)}{c_0 - U'(x)}, \qquad \pi_1^{\pm}(x) = C_1 \frac{\Psi(x)}{U'(x) - c_1}, \quad x \in G_{\pm},$$

where C_0, C_1 are normalising constants, and $\Psi(x) = \exp\left(-\lambda_0\Phi_0(x) - \lambda_1\Phi_1(x)\right)$, $\Phi_0'(x) = (c_0 - U'(x))^{-1}$, $\Phi_1'(x) = (c_1 - U'(x))^{-1}$.

The process X_ε, controlled by a periodically perturbed potential $U_0(x) - \varepsilon x \sin \omega t$, passes from one well to another with a positive probability if $c_0 + \varepsilon$ and $-c_1 + \varepsilon$ are sufficiently large.

[1]The research was supported by the Russian Science Foundation (RSF), project number 24-21-00245, https://rscf.ru/project/24-21-00245