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Stochastic vibrations of a string with moving boundaries.

The widespread use in technology of mechanical objects with moving boundaries necessitates the development of methods for their calculation. The paper considers stochastic vibrations of a string with moving boundaries. The case of a difference kernel makes it possible to reduce the problem of analyzing a system of stochastic integro-differential equations to studying a system of stochastic differential equations. To estimate the expansion coefficients, it is proposed to use statistical numerical methods.

The differential equation, boundary and initial conditions describing the vibrations of the string have the form [1,2]

$$V_{\tau\tau}(\xi, \tau) - 2vV_{\xi\tau}(\xi, \tau) - (1-v^2)V_{\xi\xi}(\xi, \tau) - d \int_{\xi}^{\xi+v\tau} K(-d(\xi-\eta))V_{\xi\xi}(\eta, \frac{1}{v}(\xi-\eta)+\tau)d\eta = F(\xi, \tau); \quad (1)$$

$$V(0, \tau) = 0; \quad V(1, \tau) = 0; \quad V(\xi, 0) = V_1(\xi); \quad V_{\tau}(\xi, 0) = 0. \quad (2)$$

Theorem. The solution to problem (1)–(2) can be given as a string
 $V(\xi, \tau) = \sum_{n=1}^{\infty} V_n(\tau) \sin(\omega_n \xi).$

The system of integro-differential equations is transformed into a system of random differential equations.

REFERENCES

1. *Litvinov V.L.* Solution of boundary value problems with moving boundaries using an approximate method for constructing solutions of integro-differential equations // Tr. Institute of Mathematics and Mechanics, Ural Branch of the Russian Academy of Sciences. 2020. Vol. 26, No. 2. P. 188-199.