15th INTERNATIONAL CONFERENCE
Dynamical Systems — Theory and Applications
December 2-5, 2019. Lodz, POLAND.

paper id: MAT299

Complex vibrations of flexible beam NEMS elements, taking into account Casimir's forces in additive white noise

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Abstract: The equations of motion for partial derivatives of the structural members of the NEMS in the form of a beam element of the beams, the boundary and initial conditions, taking into account the Euler-Bernoulli hypotheses and geometric nonlinearity in the form of T. von Karman, were obtained. Hamilton's energy principle has been applied. The system of nonlinear partial differential equations is reduced to the Cauchy problem by the second-order finite difference method. The Cauchy problem by the fourth-order Runge-Kutta method was solved. The analysis of the results is carried out by the methods of nonlinear dynamics and the qualitative theory of differential equations. The effect of Casimir force and additive white noise on the nonlinear dynamics of the beam element of the NEMS was studied.

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