**The Moment Problem in Control Problems of Elastic Dynamic Systems**

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*Methods for damping for oscillations of elements of complex mechanical systems such as strings and membranes began to develop rapidly in the 70s of the last century. The most significant results were obtained by J.-L. Lions, D. Lagnesse, D. Russel, A. Butkovskiy, which dealt with cases of string oscillations (with various types of restraints at the borders) and circular membrane. In this paper we consider the control problem of elastic dynamic systems modeled by partial differential equations of the fourth order, hyperbolic by Petrovsky, which describe, in particular, oscillations in antennas and other elements of space platforms, pipelines, bridge openings. The control problem is to find the minimum time to damp oscillations arisen due to initial perturbation of the system. To solve this problem we derive trigonometric moment problem (infinite system of integral equations of first order for the time component of the control function). We prove the existence of the minimum time and optimal control in case of beams and plates. Wherein time for damping of oscillations and optimal control are given in explicit form. To obtain these results we study the asymptotic behavior of eigenvalues of the corresponding spectral problem by using the classic theorem of N. Levinson (on the basis of the Riesz exponential systems) and Bellman (of almost orthogonal trigonometric systems). Note that the classical solutions of the moment problem presented in the form of infinite series of functions and to obtain the elements of these series is a separate difficult problem. Therefore in order to find the approximate solution we consider the class of control functions such as point moving and slim dampers and build effective numerical methods. Given examples confirm that proposed numerical methods allow us to find solution of problem with sufficient accuracy.*

***Keywords:*** *damping of oscillations, trigonometric moment problem, orthogonal systems and Riesz basis, asymptotic moment problem, stationary and moving dampers, reduction method, coordinate descent method*

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