

On basis properties of root functions of a nonselfadjoint boundary value problem

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The boundary value problem is considered which occurs in the theory of small transversal vibrations of a inhomogeneous string. The ends of the string assumed to be fixed and the midpoint of the string is damped by a pointwise force. The problem is reduced to a spectral problem for a linear operator pencil on a direct sum of two Banach spaces. The spectrum of the pencil can be presented as a union of two subsequences. The asymptotic behavior of eigenvalues and eigenfunctions are obtained, as well as of its Green function. These leads us to study the completeness of root functions in Lebesgue spaces. The uniform boundedness of Riesz projections of the problem also investigated and as a consequence the basisness of root functions of the problem is studied.