

Solution of a singularly perturbed Cauchy problem for linear systems of ordinary differential equations by the method of spectral decomposition

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Abstract: In this paper a completely new method, which is essentially an operational method [1] and is based on the spectral theory of equations with deviating argument [2-7], is proposed. The method consists in the fact that the spectral decompositions of Cauchy problem solutions are constructed by the system of eigenfunctions of the self-adjoint differential operators with deviating argument. It turned out that so-called fundamental solutions of a system of linear differential equations and equations of higher order play a special role. At the asymptotic analysis of solutions of singularly perturbed problems the so-called regulatory functions of S.A. Lomov occupy the important place. For the first time it is proved that the fundamental solutions of linear differential equations act as the regularizing functions of S.A. Lomov.

Keywords: Spectrum, spectral decomposition, deviating argument, singular perturbation

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