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RESOLVENT ESTIMATES FOR ORDINARY DIFFERENTIAL OPERATORS OF MIXED TYPE

A. V. Chueshev

In the present article, we consider the problem

$$Hu + \lambda u = f(t), \quad t \in (0,1), \tag{1}$$

where λ is a complex parameter and H stands for an ordinary differential operator of order $l \geq 2$ defined by the differential expression

$$Hu = k(t)u^{(l)}(t) + a(t)u^{(l-1)}(t) + \sum_{j=0}^{l-2} a_j(t)u^{(j)}(t),$$

with $u^{(j)}(t) = \frac{d^j u(t)}{dt^j}$, and the collection of boundary conditions

$$l_1 u = u^{(p)}(1) + \sum_{\nu=0}^{p-1} \alpha_\nu u^{(\nu)}(1) = 0, \quad l_0 u = u^{(q)}(0) + \sum_{\nu=0}^{q-1} \beta_\nu u^{(\nu)}(0) = 0.$$

Using a priori bounds, we prove existence and uniqueness theorems of boundary value problems for linear ordinary differential equations and study dependence of solutions on a parameter. The peculiarity of the problem lies in the fact that the leading coefficient in the equation is of an arbitrary sign on the interval $(0,1)$.

Key words and phrases: degenerate ordinary differential operator of arbitrary order, resolvent estimate, resolvent set.

Chueshev Aleksandr Viktorovich
Novosibirsk State University,
630090 Novosibirsk, Russia.
E-mail: chueshev@mail.ru

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