# About of the spectrum of regular boundary value problems for one-dimensional differential operators

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**Abstract:** In this paper, established that every regular non-volterra problem has an infinite spectrum.

On $[0, b]$ we consider the general linear ordinary differential equation

$$(1) \qquad L_Q u = u^{(m)}(x) + \sum a_k(x) u^{(k)}(x) = f(x)$$

with generalized regular boundary conditions

$$(2) \qquad Q_1 u(0) + Q_2 u(b) = 0$$

where $Q_1$ and $Q_2$ are linear operators defined on the traces of the functions $u(0)$ and $u(b)$ and on the traces of its derivatives.

It should be noted that the general form of the regular boundary conditions for equation (1) is given by Kalmenov and Otelbaev (2016).

The question arises. Is there a regular boundary value problem for differential equations that has a finite spectrum?

For the wide class of differential equations Kalmenov and Suragan (2008) established that if a regular boundary value problem has at least one eigenvalue, then the spectrum of this problem is infinite.

In this paper, we assume that $a_k(x) \in C^\infty[0, b]$, $\left|\frac{d^m}{dx^m} a_\alpha(x)\right| \leq M$, $x \in [0, b]$, $m = 0, 1, 2, .....$ established that every regular non-volterra problem (the spectrum consists of at least one point) has an infinite spectrum.

This research is financially supported by a grant AP05133239 and by the target program BR05236656 from the Science Committee from the Ministry of Science and Education of the Republic of Kazakhstan.

**Keywords:** One-dimensional differential operators; regular boundary conditions; infinity spectrum; eigenvalue

**2010 Mathematics Subject Classification:** 34L10, 47E05, 34B09

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