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TRANSFORMATION OPERATOR FOR A CLASS OF THE DIFFERENTIAL OPERATORS WITH A SINGULARITY

Abstract

In article, existence of transformation operators was proved for a class ofSturm-Liouville differential operators, which have singularity in finite interval and some properties of kernel of this transformation operator was investigated

1. Introduction. For solving of the inverse problems for Sturm-Liouville differential operators as regular as singular the transformation operators have a special place. In [1] some types of transform operators for Sturm-Liouville regular operators were given. In the present paper the construction method of transform operator is given for one class of Sturm-Liouville operators with a singularity on the finite segment. In the case when Sturm-Liouville operator has a singularity of Bessel's type (- -, / is a positive entire number) on the finite segment the transform operator was constructed in [2], [3], and in the case [0,00) it was given in [4]. When Sturm-Liouville operator has a singularity of Culon type (—, *A* is some feal number) on the finite segment, the transformation operator was constructed in [5].

2. Construction of **the integral equation.** Let's consider Sturm-Liouville differential equation

(1)

where *q(x) is* a real function satisfying the condition

(2)

So as in the considered case the function *q(x)* satisfies the condition (2) it means that the differential equation (1) has a singularity in point *x* - 0 of the order 1 < *a* < *2.*

Let's denote by *S(x,X)* the solution of the differential equation (I) satisfying the conditions

$$S(0,A) = 0,S'(0,A)=l. \tag{3}$$

Then function *S(x, X)* will satisfy the following integral equation:

(4)

Now let's prove that for solution *S(x,A)* of the differential equation (1) it is valid the representation:

In order to function *S(x,A)* of form (5) to satisfy the equation (4), it must be fulfilled the equality: