AMIROVA LJ.

ON THE SOLVABILITY OF BOUNDARY-VALUE PROBLEMS FOR A CLASS OF SECOND ORDER OPERATOR-DIFFERENTIAL EQUATIONS

Abstract

Sufficient conditions for the existence of the solution to initial boundary value problem are found for second order operator-differential equatiom whose principal part contains a normal operator. These conditions are expressed by the coefficients of a operator-differential equation.

A theorem on the existence of holomorphic solutions of the initial-boundary value problem is proved for a class of the second order operator- differential equations whose symbol contains a normal operator at the principal part.

In a separable Hilbert space H consider the boundary-value problem

$$P(d/dzX^=-u^t(z) + A^2u\{z)_+A,u'(z) + A_2u\{z)=f(_z), \quad zzS_a, \tag{1}$$

$$w'(0)=0, \tag{2}$$

where S_a =^|jargz|<a^0<a *<nj1,* A_u A_{2t} A are linear operators in *H,f(z)* and *u(z)* are holomorphic at the sector S_a vector functions with values in H . Further, we assume the fulfillment of the following conditions:

1) A is a normal operator with compact continuous inverse A''^1, whose spectrum is contained in a cone sector

2) $Bj = AjA\sim^J$ (j -1,2) are bounded operators in H ;
3) the members a and s satisfy the condition: $0 < a + e < nj2$.

It is obvious that by fulfilling the condition 1) the operator A has a polar expansion $A = UC$, where U is a unitary, and C is a positive-defined self-adjoint operator in H , moreover, $D(A)=D(A^*)=D(C)$ and for any $xeD(A)$ $\|Ax\| = hCx =$

Definition domain of the operator C^y (y 2:0) becomes the Hilbert space H_y with respect to the norm |x|? =|C*jj)xeZ)(c)'). Further, denote by 1₂(^ :#) a Hilbert space of vector-functions *f{t)* determined in R_+ = **(0?oo)** with values in H , for which

$$\|f\|_{L_2} = \left(\int_0^\infty \|f(t)\|^2 dt\right)^{\frac{1}{2}} < \infty$$

Denote by H_2(^a^ '■ H) ^a set^ °f vector-functions *f(z)* determined in S_a, with values in H, which are holomorphic in S_a and at each pe[~a,a] of vector functions f_v = /(/e^19^* je i^ (й+ :#). This linear set is a Hilbert space with respect to the norm [1]

Determine the following Hilbert spaces