

# On some classes of complete linear differential equations of the second order in Hilbert space

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In abstract Hilbert space  $\mathcal{H}$  we study the Cauchy problem for differential equation

$$A \frac{d^2 u}{dt^2} + (F + iK) \frac{du}{dt} + Bu = f(t), \quad u(0) = u^0, \quad u'(0) = u^1, \quad (1)$$

with selfadjoint operator coefficients. We suppose that the operator  $F$  is dominating in (1), i.e.,

$$D(F) \subset D(B), \quad D(F) \subset D(K), \quad (2)$$

and

$$0 < A \in \mathcal{L}(\mathcal{H}), \quad F \geq \gamma_F I, \quad B \geq \gamma_B I, \quad \gamma_F, \gamma_B \in \mathbb{R}. \quad (3)$$

Using the semi-group theory we prove theorems on strong solvability of problem (1)–(3) under some additional assumptions.

The case when  $B \gg 0$ ,  $D(B^{1/2}) \subset D(F)$  is studied also. We give applications of these results in some problems on small movements of continuous media.

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