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LINEAR EVOLUTION EQUATIONS OF NON-PARABOLIC TYPE WITH VARIABLE DOMAINS

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CONTENTS.

1. Introduction. We consider linear evolution equations of "hyperbolic" type, that is, non-parabolic type, in a Banach space X

$$\begin{cases} du(t)/dt = A_0(t)u(t) & 0 < t \leqq T \\ u(0) = u_0 \in D(A_0(0)) , \end{cases} \tag{1.1}$$

where $A_0(t)$ is the generator of a semigroup on X and its domain $D(A_0(t))$ depends on t.

It is our main intention to give an abstract formulation of the mixed problem (including Neumann conditions) for hyperbolic partial differential equations. For this purpose we modify Kato's formulation [5] which is the following: the space X contains a dense subspace Y $(\subset D(A_0(t)))$ which is a Banach space with respect to the stronger norm, and each $A_0(t)$ generates a semigroup on Y. Instead of Y we define a family of closed subspaces $Y(t)$ $(\subset D(A_0(t)))$ of the space Y so that $A_0(t)$ generates a semigroup on $Y(t)$. Roughly speaking, our formulation reduces to his when $Y(t) = Y$.

The basic idea is similar to [8], but the assumptions, and hence the proofs, are essentially different: the result of [8] was incomplete in the sense that it does not seem applicable to partial differential equations.

In the present paper we give only a simple application to the mixed problem for wave equations with Neumann conditions. Further applications to hyperbolic partial differential equations will be discussed in subsequent articles.

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