EVOLUTION EQUATIONS OF PARABOLIC TYPE

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1. INTRODUCTION

The aim of this talk is to report some recent results concerning linear and nonlinear evolution equations of parabolic type in Banach spaces.

Let

(L) $du/dt + A(t)u = f(t)$, $0 < t \leq T$

(Q) $du/dt + A(t,u)u = f(t,u)$, $0 < t \leq T$

be linear and quasilinear evolution equations of parabolic type in a Banach space X respectively. By "parabolic type" we mean that $A(t)$ and $A(t,u)$ are all the infinitesimal generators of analytic linear semigroups on X (we do not necessarily assume that the domains of the operators $A(t)$ and $A(t,u)$ are dense subspaces of X, so the semigroups generated by them may not be of class C_0). The domains $D(A(t))$ and $D(A(t,u))$ of $A(t)$ and $A(t,u)$ are allowed to vary with t or u, but it is assumed that there exists a number $0 < h \leq 1$ such that the domains $D(A(t)^h)$ and $D(A(t,u)^h)$ of the fractional powers $A(t)^h$ and $A(t,u)^h$ respectively are independent of t and u.

In Section 2 we shall study the linear equation (L) by constructing a fundamental solution (evolution operator) for (L).

In Section 3 we shall consider the initial value problem