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PARABOLIC VOLTERRA INTEGRODIFFERENTIAL EQUATIONS OF CONVOLUTION TYPE

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ABSTRACT. Linear abstract parabolic Volterra integrodifferential equations of convolution type with L^1 kernel are considered. Under suitable assumptions it is proved that strict solutions exist and that many of the maximal regularity properties of the solutions of parabolic evolution equations are inherited. The results are then applied to parabolic partial integrodifferential equations.

1. Introduction. Let X be a Banach space, and let $A : D(A) \subset X \to X$ be the infinitesimal generator of an analytic semigroup $S(t)$ on X. Moreover, let $B : D(B) \subset X \to X$ be a linear operator with domain $D(B) \supseteq D(A)$. Given $T > 0$ we shall consider the following initial value problem

$$
\begin{aligned}
&u'(t) = Au(t) + \int_0^t k(t-s)Bu(s)\,ds + f(t), \qquad t \in \,]0, T[\\
&u(0) = x
\end{aligned}
\tag{1.1}
$$

where f and x are given. In this paper we do not assume that f is continuous.

Problem (1.1) arises as an abstract version of parabolic partial integrodifferential equations of the following kind:

$$
\begin{aligned}
u_t(t,\xi) &= Eu(t,\xi) + \int_0^t k(t-s)Lu(s,\xi)\,ds + f(t,\xi), \\
&\qquad (t,\xi) \in \,]0,T[\, \times \Omega \\
u(0,\xi) &= x(\xi), \qquad \xi \in \Omega
\end{aligned}
\tag{1.2}
$$

with suitable boundary conditions. Here E is an elliptic operator in Ω and L is a differential operator of order less than or equal to the order

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