AN IDENTIFICATION PROBLEM FOR AN ABSTRACT SYSTEM OF LINEAR EVOLUTION EQUATIONS IN A BANACH SPACE

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Abstract. We prove both the existence and uniqueness of a solution to the identification problem: find an element $z \in X$ and a function $u : [0,1] \rightarrow X$ satisfying
\[
\begin{align*}
\frac{du}{dt}(t) &= Au(t) + F(t)z, \quad t \in [0,1] \\
&
\end{align*}
\]
\[
\begin{align*}
u(0) &= u_0, \\
&
\mu([0,1])^{-1} \int_0^1 d\mu(t)u(t) = u_1,
\end{align*}
\]
where $A$ is the infinitesimal generator of a $C_0$-semigroup in a Banach space $X$, $F \in C^1([0,1];L(X))$ and $\mu$ is countably additive $L(X)$-valued measure on $[0,1]$ with $\mu([0,1])$ being invertible.

We stress that the present result extends to the case of $C_0$-semigroups the explicit representation formulae for the solution of problem $(IP)$ obtained by Yu. Anikonov and A. Lorenzi [1] in the specific case when $A$ is the infinitesimal generator of an analytic semigroup of contractions and $\mu = \lambda I$, $\lambda$ being a finite Borel measure on $[0,1]$. So, our abstract result handles both parabolic and hyperbolic equations and systems.

REFERENCES


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This research was done while the second author was visiting Dipartimento di Matematica “F. Enriques”, Università degli Studi di Milano, March 2-15, 2008, within the ERASMUS Program. It was partially supported by the CNCSIS Grant A No.1159/2008.