Nonlocal solutions of hyperbolic type equations

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Abstract

In this talk we consider existence and uniqueness of (classical) solutions to abstract nonlocal Cauchy problems for nonlinear evolution equations of the form

\[
\begin{aligned}
\frac{\mathrm{d}}{\mathrm{d}t}u(t) + A(t)u(t) &= f(t) + C(t,K(t)u)g(t) \quad \text{for } t \in I := [0,T], \\
u(0) &= u_0 + Mu.
\end{aligned}
\] (P)

Here \( \{A(t); t \in I\} \) is a family of closed linear operators in the complex Hilbert space \( X \), \( K(t) : C(I;Y) \to \mathbb{C} \) is linear and bounded for all \( t \in I \), \( K(\cdot) \) is continuous on \( I \) and \( M : C(I;Y) \to Y \) is a bounded linear operator, where \( Y \) is a subspace of \( X \).

By [OY], we can show that \( A(t) \) has a unique evolution operator. And hence, by Schauder Tychonoff's fixed point theorem, we are able to solve problem (P). The result will appear in [MY]. Typical examples of \( M \) and \( K(t) \) and applications to Schrödinger equations will be discussed.

References


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