Nonlocal solutions of hyperbolic type equations

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Abstract

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

$$\begin{cases} \dfrac{d}{dt}u(t) + A(t)u(t) = f(t) + C(t, K(t)u)g(t) \quad \text{for } t \in I := [0, T], \\ \\ u(0) = u_0 + Mu. \end{cases} \tag{P}$$

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

[MY] L. Malaguti and K. Yoshii, *Nonlocal solutions of hyperbolic type equations and their controllability*, in preparation.

[OY] N. Okazawa and K. Yoshii, *Linear Schrödinger evolution equations with moving Coulomb singularities*, J. Differential Equations **254 (2013), 2964–2999.**

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