

Liang, Jin; Liu, James; Xiao, Ti-Jun

Nonlocal Cauchy problems governed by compact operator families. (English) Zbl 1083.34045
Nonlinear Anal., Theory Methods Appl., Ser. A, Theory Methods 57, No. 2, 183-189 (2004).

Let A be the infinitesimal generator of a compact semigroup of linear operators on a Banach space X . The authors establish the existence of mild solutions to the nonlocal Cauchy problem

$$u'(t) = Au(t) + f(t, u(t)), \quad t \in [t_0, t_0 + T], \quad u(t_0) + g(u) = u_0,$$

under some conditions on f and g , where $f : [t_0, t_0 + T] \times X \rightarrow X$ and $g : C([t_0, t_0 + T]; X) \rightarrow X$ are given functions. They assume a Lipschitz condition on f with respect to u , but they do not require any compactness assumption on g , opposed to *S. Aizicovici* and *M. McKibben* [Nonlinear Anal., Theory Methods Appl. 39, No. 5(A), 649-668 (2000; [Zbl 0954.34055](#))] and *L. Byszewski* and *H. Akca* [Nonlinear Anal., Theory Methods Appl. 34, No. 1, 65-72 (1998; [Zbl 0934.34068](#))], where the authors assume a compactness property for g , but do not require any Lipschitz condition on f .

Reviewer: [Behzad Djafari-Rouhani \(El-Paso\)](#)

MSC:

[34G20](#) Nonlinear differential equations in abstract spaces
[47D06](#) One-parameter semigroups and linear evolution equations

Cited in **69** Documents

Keywords:

[nonlocal Cauchy problem](#); [mild solution](#); [compact operator families](#); [equicontinuous family of functions](#); [integrodifferential equation](#)

Full Text: [DOI](#)

References:

- [1] Aizicovici, S.; McKibben, M., Existence results for a class of abstract nonlocal Cauchy problems, Nonlinear anal. ser. A: theory methods, 39, 649-668, (2000) · [Zbl 0954.34055](#)
- [2] Boucherif, A., First-order differential inclusions with nonlocal initial conditions, Appl. math. lett, 15, 409-414, (2002) · [Zbl 1025.34009](#)
- [3] Byszewski, L., Theorems about the existence and uniqueness of solutions of a semilinear evolution nonlocal Cauchy problem, J. math. anal. appl, 162, 494-505, (1991) · [Zbl 0748.34040](#)
- [4] Byszewski, L., Uniqueness of solutions of parabolic semilinear nonlocal-boundary problems, J. math. anal. appl, 165, 472-478, (1992) · [Zbl 0774.35038](#)
- [5] Byszewski, L., Application of properties of the right-hand sides of evolution equations to an investigation of nonlocal evolution problems, Nonlinear anal. TMA, 33, 413-426, (1998) · [Zbl 0933.34064](#)
- [6] Byszewski, L.; Akca, H., Existence of solutions of a semilinear functional-differential evolution nonlocal problem, Nonlinear anal. TMA, 34, 65-72, (1998) · [Zbl 0934.34068](#)
- [7] Byszewski, L.; Lakshmikantham, V., Theorem about the existence and uniqueness of a solution of a nonlocal abstract Cauchy problem in a Banach space, Applicable anal, 40, 11-19, (1990) · [Zbl 0694.34001](#)
- [8] Byszewski, L.; Lakshmikantham, V., Monotone iterative technique for nonlocal hyperbolic differential problem, J. math. phys. sci, 26, 4, 345-359, (1992) · [Zbl 0811.35083](#)
- [9] Deng, K., Exponential decay of solutions of semilinear parabolic equations with non-local initial conditions, J. math. anal. appl, 179, 630-637, (1993) · [Zbl 0798.35076](#)
- [10] Jackson, D., Existence and uniqueness of solutions of a semilinear nonlocal parabolic equations, J. math. anal. appl, 172, 256-265, (1993) · [Zbl 0814.35060](#)
- [11] Liang, J.; van Casteren, J.; Xiao, T.J., Nonlocal Cauchy problems for semilinear evolution equations, Nonlinear anal. ser. A: theory methods, 50, 173-189, (2002) · [Zbl 1009.34052](#)
- [12] J. Liang, T.J. Xiao, Semilinear integrodifferential equations with nonlocal initial conditions, Comput. Math. Appl., to appear. · [Zbl 1068.45014](#)
- [13] Lin, Y.; Liu, J.H., Semilinear integrodifferential equations with nonlocal Cauchy problem, Nonlinear anal. TMA, 26, 1023-1033,

(1996) · [Zbl 0916.45014](#)

- [14] Liu, J.H., A remark on the mild solutions of non-local evolution equations, *Semigroup forum*, 26, 1023-1033, (2003)
- [15] Ntouyas, S.K.; Tsamatos, P.Ch., Global existence for semilinear evolution equations with nonlocal conditions, *J. math. anal. appl.*, 210, 679-687, (1997) · [Zbl 0884.34069](#)

This reference list is based on information provided by the publisher or from digital mathematics libraries. Its items are heuristically matched to zbMATH identifiers and may contain data conversion errors. It attempts to reflect the references listed in the original paper as accurately as possible without claiming the completeness or perfect precision of the matching.