Obukhovskii, Valeri; **Yao, Jen-Chih**

Some existence results for fractional functional differential equations. (English)

Zbl 1202.34141
Fixed Point Theory 11, No. 1, 85-96 (2010).

This paper deals with the local and global existence of the following Cauchy problem in a separable Banach space E:

$$D^{\alpha}y(t) = Ay(t) + f(t, y_t), \quad t \in [0, T];\ y(t) = \widetilde{\psi}(t),\ -\tau \leq \theta \leq 0,$$

where D^{α}, $0 < \alpha < 1$ stands for the Riemann-Liouville fractional derivative and $A : D(A) \subset E \to E$ is a linear closed (not necessarily bounded) operator generating an immediately norm-continuous semigroup $\{e^{At}\}_{t\geq 0}$, $\widetilde{\psi} \in C = C([0, T]; E)$ with $\widetilde{\psi}(0) = 0$. For $t \in [0, T]$, the function $y_t \in C = C([0, T]; E)$ is defined as $y_t(\theta) = y(t + \theta)$, $-\tau \leq \theta \leq 0$. The results are obtained by means of condensing maps theory, assuming that $f : [0, T] \times C \to E$ is continuous such that f satisfies the Ambrosetti-Sadovskii regularity condition expressed in terms of the measures of non-compactness.

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MSC:

34K37	Functional-differential equations with fractional derivatives
34K30	Functional-differential equations in abstract spaces
34K40	Neutral functional-differential equations
47H09	Contraction-type mappings, nonexpansive mappings, A-proper mappings, etc.
47H10	Fixed-point theorems

Keywords:

fractional derivative; fractional differential equation; functional differential equation; neutral functional differential equation; mild solution; Cauchy problem; existence theorem; measure of noncompactness; fixed point; condensing map

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