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**Strong solutions of semilinear equations with lower fractional derivatives.** (English)

Zbl 1451.34013

Kravchenko, Vladislav V. (ed.) et al., Transmutation operators and applications. Cham: Birkhäuser. Trends Math., 573-585 (2020).

Summary: We find conditions of a unique strong solution existence for the Cauchy problem to solved with respect to the highest fractional Gerasimov-Caputo derivative semilinear fractional order equation in a Banach space with nonlinear operator, depending on the lower Gerasimov-Caputo derivatives. Then the generalized Showalter-Sidorov problem for semilinear fractional order equation in a Banach space with a degenerate linear operator at the highest order fractional derivative is researched in the sense of strong solution. The nonlinear operator in this equation depends on time and on lower fractional derivatives. The corresponding unique solvability theorem was applied to study of linear degenerate fractional order equation with depending on time linear operators at lower fractional derivatives. Applications of the abstract results are demonstrated on examples of initial-boundary value problems to partial differential equations with time-fractional derivatives.

For the entire collection see [Zbl 1443.34001].

**MSC:**

**34A08** Fractional ordinary differential equations

**34G10** Linear differential equations in abstract spaces

**49J20** Existence theories for optimal control problems involving partial differential equations

Cited in **2** Documents

**Keywords:**

fractional-order differential equation; fractional Gerasimov-Caputo derivative; degenerate evolution equation; Cauchy problem; generalized Showalter-Sidorov problem; initial boundary value problem

**Full Text:** DOI

**References:**

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