Approximation of inverse problems for fractional equations

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Abstract: This report is devoted to the approximation of inverse problem in a Banach space E

$$(\mathbf{D}_t^\alpha u)(t) = Au(t) + F(t)f, \quad t \in [0,T], u(0) = u^0, u(T) = u^T, \ 0 < \alpha < 1,$$

with operator A, which generates analytic and compact α-times resolvent family $\{S_\alpha(t,A)\}_{t\geq 0}$, function $F(\cdot) \in C^1([0,T])$, $u^0, u^T \in D(A)$ are given and $f \in E$ is unknown element.

Let A_n be a generator of analytic and compact C_0-semigroup $\exp(\cdot A_n)$. Consider in a Banach space E_n the problem

$$(\mathbf{D}_t^\alpha u_n)(t) = A_n u_n(t) + F_n(t)f_n, \quad t \in [0,T]$$

with $F_n(\cdot) \in C^1([0,T])$ and

$$u_n(0) = u_n^0 \in D(A_n), \ u_n(T) = u_n^T \in D(A_n).$$

We develop ideas of [1] and use technique of [2] to obtain the semidiscrete approximation theorem.

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