

ANALYSIS OF THE NULL CONTROLLABILITY OF SPACE-TIME FRACTIONAL DIFFUSION EQUATIONS

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Abstract: We consider the following class of fractional partial differential equations of evolution in which two parameters are used to sharpen the models.

$$\left\{ \begin{array}{l} \mathbb{D}_t^\alpha u(t, x) + (-\Delta)^s u(t, x) = f(t, u) \quad \text{on } \Omega \times (0, T), \\ + \text{Intial conditions,} \\ + \text{Boundary conditions.} \end{array} \right.$$

Here $0 < \alpha \leq 2$, $0 < s \leq 1$, $\Omega \subset \mathbb{R}^N$ is an open set with boundary $\partial\Omega$, $(-\Delta)^s$ the fractional Laplace operator and \mathbb{D}_t^α denotes a time fractional derivative. After clarifying which initial and boundary conditions make the system well posed, we show what is so far known about the null controllability of the above system. We conclude by given several open problems. The talk will be delivered for a wide audience avoiding unnecessary technicalities.

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