

CONTROLLABILITY OF SPACE-TIME FRACTIONAL DIFFUSIVE AND SUPER-DIFFUSIVE 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 $T > 0$ is a fixed time, $0 < \alpha \leq 2$, $0 < s \leq 1$, $\Omega \subset \mathbb{R}^N$ is an open set with boundary $\partial\Omega$, $(-\Delta)^s$ is 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 or/and the approximate 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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