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.

\[
\begin{cases}
\mathbb{D}^\alpha_t u(t, x) + (-\Delta)^s u(t, x) = f(t, u) & \text{on } \Omega \times (0, T), \\
+ \text{Initial conditions}, \\
+ \text{Boundary conditions}.
\end{cases}
\]

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 \( \mathbb{D}^\alpha_t \) 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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