

Nonexistence of Global Solutions of Systems of Time Fractional Differential equations posed on the Heisenberg group

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Abstract

We first consider the nonlinear time fractional diffusion equation $D^{\alpha} u + D^{\beta} u - |u|^p$ posed on the Heisenberg group H , where $1 < p$ is a positive real number to be specified later; D^{α} is the Liouville-Caputo derivative of order α . For $0 < \alpha < 1, 0 < \beta \leq 1$. This equation interpolates the heat equation and the wave equation with the linear damping $D^{\beta} u$. We present the Fujita exponent for blow-up. Then establish sufficient conditions ensuring non-existence of local solutions. We extend the analysis to the case of the system $D^{\alpha} u + D^{\beta} u - |u|^p$ and $D^{\alpha} v + D^{\gamma} v - |v|^q$. Our method of proof is based on the nonlinear capacity method.

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