# BLOW-UP RESULTS FOR SPACE–TIME FRACTIONAL DYNAMICS

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Consider non-linear time-fractional stochastic reaction-diffusion equations of the following type,

$$\partial_t^\beta u_t(x) = -\nu(-\Delta)^{\alpha/2} u_t(x) + I_t^{1-\beta}[b(u) + \sigma(u)\ \dot{F}\ (t,x)]$$

in $(d+1)$ dimensions, where $\nu > 0, \beta \in (0,1)$, $\alpha \in (0,2]$. The operator $\partial_t^\beta$ is the Caputo fractional derivative while $-(-\Delta)^{\alpha/2}$ is the generator of an isotropic $\alpha$-stable Lévy process and $I_t^{1-\beta}$ is the Riesz fractional integral operator. The forcing noise denoted by $\dot{F}\ (t,x)$ is a Gaussian noise. These equations might be used as a model for materials with random thermal memory. We derive non-existence (blow-up) of global random field solutions under some additional conditions, most notably on $b$, $\sigma$ and the initial condition. Our results complement those of P. Chow in "P.-L. Chow. Unbounded positive solutions of nonlinear parabolic Itô equations. Commun. Stoch. Anal., 3(2)(2009), 211–222." and "P.-L. Chow. Explosive solutions of stochastic reaction-diffusion equations in mean $l_p$-norm. J. Differential Equations, 250(5) (2011), 2567–2580." and Foondun and Parshad "M. Foondun and R. Parshad, On non-existence of global solutions to a class of stochastic heat equations. Proc. Amer. Math. Soc. 143 (2015), no. 9, 4085–4094." among others. The results presented are our recent joint work with Sunday Asogwa, Mohammud Foondun, Wei Liu, and Jebessa Mijena.

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