

# 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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