

# BLOW-UP RESULTS FOR SPACE-TIME FRACTIONAL DYNAMICS

ERKAN NANE

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

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

in  $(d + 1)$  dimensions, where  $\beta \in (0, 1)$ , and the operator  $\partial_t^\beta$  is the Caputo fractional derivative while  $\phi : (0, \infty) \rightarrow (0, \infty)$  is a Bernstein function, 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. We consider pathwise blow-up and blow up in the moment sense.

These results are our recent joint work with Sunday Asogwa, Chansong Deng, Mohammad Foondun, Wei Liu, and Jebessa Mijena.

ERKAN NANE, 221 PARKER HALL, DEPARTMENT OF MATHEMATICS AND STATISTICS, AUBURN UNIVERSITY, AUBURN, AL 36830.

*Email address:* ezn0001@auburn.edu

*URL:* [www.auburn.edu/~ezn0001](http://www.auburn.edu/~ezn0001)