FRACTIONAL POISSON MOTION AND RELATED MODELS

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Abstract

Lévy's fractional Brownian motions on R^d with Hurst index $H \in (0,1)$ have well-known representations either as a moving average with respect to a Gaussian measure on R^d or in terms of the harmonizable representation via a complex-valued Gaussian measure. We will discuss a third class of representations based on a formalism of random balls and a Gaussian measure on $R^d \times R_+$. By replacing the Gaussian with a suitable compensated Poisson measure, this approach gives rise to another class of random fields and random processes on R^d which we call fractional Poisson motion. The one-dimensional case can be applied to studying Mandelbrot's fractal sum of pulses (Marouby 2011) and to the modeling of scheduled traffic (Avraram, Glynn, 2011).