Cioczek-Georges, Renata; **Mandelbrot, Benoît B.**
A class of micropulses and antipersistent fractional Brownian motion. (English)
Zbl 0846.60055

Summary: We begin with stochastic processes obtained as sums of "up-and-down" pulses with random moments of birth τ and random lifetime w determined by a Poisson random measure. When the pulse amplitude $\varepsilon \to 0$, while the pulse density δ increases to infinity, one obtains a process of "fractal sum of micropulses." A CLT style argument shows convergence in the sense of finite-dimensional distributions to a Gaussian process with negatively correlated increments. In the most interesting case the limit is fractional Brownian motion (FBM), a self-affine process with the scaling constant $0 < H < 1/2$. The construction is extended to the multidimensional FBM field as well as to micropulses of more complicated shape.

MSC:

60G99	Stochastic processes
60J65	Brownian motion

Cited in **1** Review
Cited in **35** Documents

Keywords:

fractal sums of pulses; fractal sums of micropulses; fractional Brownian motion; Poisson random measure; self-similarity; self-affinity; stationarity of increments

Full Text: DOI

References:

[1] Cioczek-Georges, R.; Mandelbrot, B.B., Alternative micropulses and fractional Brownian motion, (1995), Preprint · Zbl 0846.60055

[2] Cioczek-Georges, R.; Mandelbrot, B.B., Stable fractal sums of pulses: the general case, (1995), Preprint · Zbl 0844.60017

[3] Cioczek-Georges, R.; Mandelbrot, B.B.; Samorodnitsky, G.; Taqqu, M., Stable fractal sums of pulses: the cylindrical case, (1995), To appear in Bernoulli · Zbl 0844.60017

[4] Itô, K., Stochastic processes, Aarhus university lecture notes series, Vol. 16, (1969) · Zbl 0226.60053

[5] Mandelbrot, B.B., Fractal sum of pulses, and new random variables and functions, (1984), Unpublished

[6] Mandelbrot, B.B., Introduction to fractal sums of pulses, () · Zbl 0829.60032

[7] Mandelbrot, B.B., Fractal sums of pulses: self-affine global dependence and lateral limit theorems, (1995), Preprint

[8] Mandelbrot, B.B.; Van Ness, J.W., Fractional Brownian motions, fractional noises and applications, SIAM rev., 10, 422-437, (1968) · Zbl 0179.47801

[9] Resnick, S.I., Extreme values, regular variation and point processes, (1987), Springer New York · Zbl 0633.60001

[10] Takács, L., On secondary processes generated by a Poisson process and their applications in physics, Acta math. acad. sci. hungar., 5, 203-235, (1954) · Zbl 0059.12102

[11] Westcott, M., On the existence of a generalized shot-noise process, (), 73-88 · Zbl 0342.60043