

Multipower Variation for Brownian Semistationary Processes

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Abstract

In this work we study the asymptotic behaviour of power and multipower variations of processes Y :

$$Y_t = \int_{-\infty}^t g(t-s)\sigma_s W(ds) + Z_t,$$

where $g : (0, \infty) \rightarrow R$ is deterministic, $\sigma > 0$ is a random process, W is the stochastic Wiener measure, and Z is a stochastic process in the nature of a drift term. Processes of this type serve, in particular, to analyse data of velocity increments of a fluid in a turbulence regime with spot intermittency ?. The purpose of the present paper is to determine the probabilistic limit behaviour of the (multi)power variations of Y , as a basis for studying properties of the intermittency process σ . Notably the processes Y are in general not of the semimartingale kind and the established theory of multipower variation for semimartingales does not suffice for deriving the limit properties. Examples and an application to realised variance ratio are given.

This is a joint work with Ole E. Barndorff-Nielsen and Mark Podolskij.