From rough to multifractal multidimensional volatility: A multidimensional Log S-fBM model

Othmane Zarhali*[1], Emmanuel Bacry[2], and Jean-François Muzy[3]

[1]Université Paris Dauphine-PSL – Université Paris sciences et lettres – France
[2]Université Paris Dauphine - CNRS – université Paris Dauphine, PSL Resarch University – France
[3]Université de Corse - CNRS – Univrersité de Corse – France

Abstract

The multidimensional Log S-fBM model (m-Log S-fBM) extends the Log S-fBM model proposed by Wu {et al.} to the multidimensional setting. We first define the multidimensional Stationary fractional Brownian motion process (m-S-fBM), whose marginals are S-fBM processes characterized by the correlation limit T, the intermittency parameters $
λ_î2_{1 ≤ i ≤ d}$, andtheHurstexponents$
H_i_{1 ≤ i ≤ d}$.Thecross−dependencestructureiscapturedbytheco−intermittencymatrix$
ξ_{i, j}_{1 ≤ i, j ≤ d}$andtheco − Hurstmatrix$
H_{i, j}_{1 ≤ i, j ≤ d}$.
Subsequently, weintroducethem−LogS−fBM, inwhicheachmarginalfollowsaLogS−fBMprocess, whiletheirmu
S−fBM.LiketheonedimensionalLogS−fBMmodel, wedemonstratethatthemLogS−fBMiswelldefinedforcoHu

*Speaker