

Tentative Program

1) Introduction

- Fractional Brownian Motion: definitions and properties, Mandelbroth VanNess and Volterra fractional Brownian motions, fractional calculus
- Overview of other processes with long memory: fractional Levy and Arima processes

2) Applications

- Rough Volatility
- Link with fractional PDEs, fractional Heston Model
- Telecommunications, network traffic

3) Simulation methods

- Cholesky method
- Circulant embedding method, fast Fourier transform
- Hybrid scheme

4) Short-time asymptotics

- Central limit asymptotics for rough volatility
- Large deviations for fractional Brownian motion and applications

5) Markovian representations of fractional processes

Resources

- Chapter 5 in D. Nualart book "The Malliavin calculus and related topics" for stochastic analysis

with fractional Brownian motion; also see

http://www.icm2006.org/proceedings/Vol_III/contents/ICM_Vol_3_74.pdf

- The rough volatility network webpage (a lot of material on rough volatility models):
<https://sites.google.com/site/roughvol/home/>

- Webpage by Ton Dieker with code related to fractional Brownian motion:

<http://www.columbia.edu/~ad3217/fbm.html>

- P. Carmona, L. Coutin, Fractional Brownian Motion and the Markov Property. Electronic Communications in Probability (1998).