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12. Probability and Statistics

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Generalized stochastic integrals with application to fractional Brownian motion

The generalized stochastic integral of the first and higher orders up to the square-integrable processes is constructed. The integration up to the Wiener process, square-integrable martingales, Gaussian processes, especially fractional Brownian motion (FBM) with Hurst index $0 < H < 1$, is presented as particular case. Nontraditional Ito formula containing $[1/H]$ generalized stochastic integrals of higher order, Dolean exponent and Dolean equation for FBM are deduced. Stochastic differential equations containing stochastic integrals up to FBM with $0 < H < 1/2$ are investigated. Girsanov theorem for FBM with $1/2 \leq H < 1$ and with "stochastic drift" is proved.