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Aurel Iulian Stan* (stan.7@osu.edu), 1465 Mount Vernon Avenue, Marion, OH 43302.

Gaussian Calculus and Wick Products (Joint work with Paolo Da Pelo and Alberto Lanconelli from the University of Bari, Italy). Preliminary report.

In the definition of the Gaussian stochastic integral, the integrand is not multiplied by the random infinitesimal $dB(t)$ through the usual point-wise product, but through the Wick product. For this reason, the classic Newton-Leibniz fundamental theorem of Calculus does not work with the point-wise product and the famous Ito formula must be used instead. However, if one replaces the point-wise product with the Wick product, then the Newton-Leibniz formula works, and the whole theory of Gaussian stochastic integration resembles perfectly the classic theory of Riemann integration. For this reason, we believe that the natural product of the theory of Gaussian stochastic integration is the Wick product, and through its use, there is no need for Ito formula, but the classic rules of integration discovered by Leibniz are valid if one uses this product. The most important inequality used in Analysis, that guarantees the integrability of the product of two functions, is Holder inequality. We have found an analogue of the Holder inequality for the Gaussian Wick product. (Received September 21, 2010)