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Edgeworth expansion in a fixed Wiener chaos

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Abstract

The Edgeworth expansion describes asymptotic behaviours for sequences of random variables that converge in distribution. When investigating random variables that take the form of $F(X_1, \dots, X_d)$ where $X_1, \dots, X_d$ are Gaussian variables, powerful tools emerge such that the Malliavin calculus leading, for instance, to the infamous 4th moment theorem.

In this talk, after a brief overview of these previous notions, we will investigate the Edgeworth development for functionals of a Gaussian field. For an element of the p-th Wiener chaos, we derive bounds in the total variation distance between the distribution of F and the so-called Edgeworth development of F: a modified Gaussian measure. The bounds depend only on p and the variance of the carré-du-champ operator of F.