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Automated evaluation of Feynman integrals using GKZ hypergeometric systems

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Feynman integrals at any order of perturbation satisfy the Gelfand-Kapranov-Zelevinsky (GKZ) system of partial differential equations. In an ongoing collaboration, we present the automation of two techniques, namely the Groebner deformation method and the method of triangulations of point configurations, to solve such equations arising in the context of Feynman integrals, in the form of Mathematica packages, with support from specialised software such as Macaulay2
and TOPCOM. The requisite A-matrix of a Feynman integral could be obtained from the package either via the Lee-Pomenransky representation or the PDE associated with the Feynman integral. As applications, we show that our package allows one to compute both NLO and NNLO Feynman integrals and express their result as multivariate hypergeometric functions.

Session

Formal Theory

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