Lehrstuhl für Algebra und Darstellungstheorie | Pontdriesch 10-16 | 52062 Aachen | GERMANY

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Thursday, Sept 16, 12:20 pm

Marcel Wittmann

Simplification of Integration-by-Parts Coefficients for Feynman Integrals

To compute multi-loop-Feynman integrals for applications in high energy physics, a common approach is to reduce the set of target integrals to a basis of master integrals using integration by part (IBP) identities. We present an e_cient method to shorten the analytic IBP reduction coe_cients by applying an improved version of Leinartas' algorithm for multivariate partial fraction decomposition. Since all steps of the algorithm can be reduced to calculating groebner bases and syzygy modules, we implement it in a library for the computer algebra system Singular.
We observe that for integral bases with uniform transcendental (UT) weights, the partial fraction algorithm is more e_cient both with respect to its performance and the size reduction. With UT-basis the IBP reduction coe_cients' size can be reduced by a factor as large as 100, however our algorithm also works well for settings without a UT basis.
The presentation is based on our paper \IBP reduction coe_cients made simple" (authors: Janko Boehm, Marcel Wittmann, Zihao Wu, Yingxuan Xu, Yang Zhang; published arXiv:2008.13194).