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Decomposing Feynman integrals with intersection numbers

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We present a novel, simplified formulation of the recursive algorithm for evaluating intersection numbers of differential forms. This approach is applied to derive the complete decomposition of two-loop planar and non-planar Feynman integrals in terms of a master integral basis.

The new algorithm extensively utilizes various emerging tensor structures derived from the polynomial division technique and local solutions to system of differential equations, facilitating efficient computer implementation. Additionally, we employ delta-forms as generators of relative twisted cohomology groups, which allows us to bypass the usage of analytic regulators.

More generally, this algorithm can be applied to derive relations among twisted period integrals relevant for physics and mathematical studies.

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