

COMPUTING PERIODS OF RATIONAL INTEGRALS

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A period of rational integral is the result of integrating, with respect to one or several variables, a rational function along a closed path. When the period under consideration depends on a parameter, it satisfies a specific linear differential equation called Picard-Fuchs equation. These equations and their computation are important for computer algebra, but also for algebraic geometry (where they contain geometric invariants), in combinatorics (where many generating functions are periods) or in theoretical physics.

I present an efficient algorithm to compute these equations. An implementation, which involves only commutative Groebner bases and linear algebra, is available and has been successfully applied to problems that were previously out of reach.