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Numerical computations of periods and monodromy representations

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The period matrix of a smooth complex projective variety encodes the isomorphism between its singular homology and its algebraic De Rham cohomology. Numerical approximations with sufficient precision of the entries of the period matrix allow to recover some algebraic invariants of the variety. Such approximations can be obtained from an effective description of the homology of the variety, which itself can be obtained from the monodromy representation associated to a generic fibration. I will describe these methods to several hundred digits, and showcase implementations and applications, in particular to computation of the Picard rank of certain K3 surfaces.

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