Power series formulas with m-fold hypergeometric term coefficients

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Power series remain the best tool for effective evaluations of combinations of elementary functions. We overview a recent result concerning the symbolic computation of univariate formal power series.

Given a field K, of characteristic zero, a term a(n) is called m-fold hypergeometric for a positive integer m (mostly m>1), if the ratio a(n+m)/a(n) is rational in K(n). When the value of m is not specified, the phrase "m-fold hypergeometric terms" denotes all such terms. Several power series formulas are simplified when rewritten with m-fold hypergeometric term coefficients. Moreover, some other power series cannot be computed automatically without using m-fold hypergeometric terms. We present an algorithm that converts holonomic functions into power series with m-fold hypergeometric term coefficients, whenever such coefficients exist.

We demonstrate this result using our implementation in the computer algebra system Maple.

This is joint work with Wolfram Koepf.

Presenter: TEGUIA TABUGUIA, Bertrand (Universität Kassel / Max Planck Institute for Mathematics in the Sciences)

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