

Explicit Construction of Multivariate Padé Approximants and Some Applications

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The original Padé approximant has been thoroughly investigated and applied to a very large range of problems, namely control theory, numerical analysis, number theory, scattering theory in physics, theoretical chemistry and biology, etc. Now we have some algorithms to compute Padé approximants to functions in one variable case. For example, we can use MAPLE to get explicit Padé approximants to one variable functions. Although the concept of Padé approximant is essentially more than one century old, its multivariate version dates only from the early seventies. We now have only few explicit multivariate Padé approximants to functions in two or more variables. Up to date, there is no practically general algorithm we can use to compute multivariate Padé approximants like MAPLE and other software do to one variable functions. In this talk, we will discuss a method which uses functional equation and the residue theorem to explicitly construct multivariate Padé approximants to some functions and some beautiful applications of the constructions in number theory.