Machine-checkable Correctness Proofs

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Abstract

This talk will present an effort to formalize Taylor Models in the Coq proof assistant. Machine-checkable correctness proofs are facilitated by an abstract viewpoint: Taylor models can be generalized to balls in the Chebyshev metric. Extensions of elementary functions are then explained as compositions of such balls. This approach also accommodates other polynomial approximation methods than Taylor's theorem, e.g. the Remez algorithm. Depending on the method, rounding errors in the coefficients need to be accounted for in different ways. Furthermore, an alternative multiplication formula and an often applicable refinement of the Lagrange remainder will be shown.