

An Introduction to Taylor Model Methods and Tools

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The method of Taylor models provides rigorous enclosures of functions over given domains, where the bulk of the dependency is represented by a high order multivariate Taylor polynomial, and the remaining error is enclosed by a remainder bound. In this talk, we will discuss how to construct Taylor model arithmetic on computers, which naturally includes integrations as a part of arithmetic. Computations using Taylor models provide rigorous results, and advantageous features of the method have shown to be able to solve various practical problems that were unsolvable earlier. The applications start from mere range bounding of functions, leading to sophisticated rigorous global optimization, and the use for rigorous solvers of differential equations, and more.