Title:

Newton method in truncated polynomial algebras

Abstract:

In this work we present how the Newton method evolves when applied to truncated polynomial algebras. This application allows us to determine an approximation of the solution of a nonlinear equation by means of its Taylor polynomial. Truncated polynomial algebras consists in the substitute the floating point operations by an specific arithmetic that allows to operate polynomials of a polynomial algebra.
We show that the iterative procedure given by Newton's method mimics Newton's method for real valued functions in the sense that at each iterate the number of correct coefficients duplicates at each iterate. We will also show numerical results for those cases in which the initial seed is an approximation of the solution at order 0.