

Rigorous Integration of Non-Linear Ordinary Differential Equations in Chebyshev Basis

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In our work, we introduce a new approach to long term stabilization of the Taylor model-based verified integrator. Our approach for suppression the wrapping effect over several integration steps is based on affine arithmetic. It does not include the inversion of a matrix containing the linear part of the Taylor model as required in the known methods of shrink wrapping and preconditioning. This allows integration of Taylor models where the linear part does not dominate the non-linear part of the Taylor model. Moreover, our implementation allows various underlying polynomial representations. We present the required polynomial operations in both power basis and Chebyshev basis and compare computational results for both representations.