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**A hierarchy of truncation error estimates for the numerical solution of a system of ordinary differential equations with techniques based on the Tau method.** (English) [Zbl 0688.65055](#)

Numerical treatment of differential equations, Sel. Pap. 4th Int. Semin., NUMDIFF, Halle-Wittenberg/GDR 1987, Teubner-Texte Math. 104, 113-121 (1988).

A local truncation error analysis of the Tau method is given for systems of differential equations. The local truncation errors induced by the Tau method are compared for various perturbation terms.

It is shown that for a perturbation term expressed by a linear combination of monomials which leads to a classical power series expansion, the truncation error is much larger than that for the perturbation term expressed by a linear combination of Chebyshev polynomials. In the case of a perturbation term represented in terms of Legendre polynomials the truncation errors become even smaller than that for the Chebyshev polynomials.

The presented results relate to a system with constant coefficients. With the choice of a suitable segmentation they can be used also to approximate systems with variable coefficients. Nonlinear differential equations are treated with the Tau method by using an iterative technique based on the solution of a sequence of problems defined by linear differential equations with variable coefficients. Hence, the technique presented in the paper provides the right background for analyzing the behavior of the Tau method in the numerical treatment of nonlinear systems.

Reviewer: [I.Dvořák](#)

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