

El-Daou, Mohamed K.

Computable error bounds for coefficients perturbation methods. (English) Zbl 1239.65044
Computing 69, No. 4, 305-317 (2002).

Summary: The coefficients perturbation method (CPM) is a numerical technique for solving ordinary differential equations (ODE) associated with initial or boundary conditions. The basic principle of CPM is to find the exact solution of an approximation problem obtained from the original one by perturbing the coefficients of the ODE, as well as the conditions associated to it. In this paper we shall develop formulae for calculating tight error bounds for CPM when this technique is applied to second order linear ODEs. Unlike results reported in the literature, ours do not require any a priori information concerning the exact error function or its derivative. The results of this paper apply in particular to the Tau Method and to any approximation procedure equivalent to it. The convergence of the derived bounds is also discussed, and illustrated numerically.

MSC:

- [65L05](#) Numerical methods for initial value problems
- [65L70](#) Error bounds for numerical methods for ordinary differential equations
- [65L99](#) Numerical methods for ordinary differential equations
- [65L20](#) Stability and convergence of numerical methods for ordinary differential equations

Cited in **6** Documents

Keywords:

[ordinary differential equations](#); [perturbed coefficients](#); [CP methods](#); [tau method](#)

Full Text: [DOI](#)