

ABSTRACT

The thesis contains some global spline collocation procedures for the numerical approximation of certain class of two-point boundary value problems involving ordinary differential equations.

Spline functions are a very adaptable tool to develop global numerical procedures for solving several boundary value problems. They have the advantage of approximating the solution functions and its derivatives not only at the knots but also at any point in the interval.

In this work, schemes of various orders are developed and their error equations are theoretically analysed. The matrices arising from these schemes are of band structure and they can be efficiently used in a digital computer; the matrices also possess some interesting and useful properties such as irreducibility, diagonal dominance and monotonicity. In addition to the above characteristics, the matrices to be inverted in the error analysis are symmetric in nature.

Numerical results are presented to illustrate the computational behaviour of various schemes and to verify the theoretically estimated convergence orders. For the sake of comparison, results using certain well-known methods are also tabulated.

KEY WORDS : Boundary Value Problems, Spline Functions, Convergence, Matrices, Symmetry, Irreducible, Diagonal Dominant, Monotone, Error Analysis.