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TITLE OF THE THESIS: Spline Function Approximation for Solution of Differential Equations.

ABSTRACT

Numerical techniques for solving differential equations occurring in scientific and engineering problems are not only feasible but also very desirable. One of the reasons is that numerical methods can give the solution when ordinary analytical methods fails. Numerical methods give the tools to convert the differential equation into difference equation. These difference equations are algebraic in nature and can be solved by using the iterative techniques if they are consistent. Since digital computers provide a nearly effortless way to perform the simple but long and tedious computations involved in problems solved by numerical methods, the advent of this marvelous servant has revived interest in what would otherwise be only a specialized field of applied mathematics. The lively interest in numerical methods is their interrelation with digital computers. The price one pays for the general applicability of the numerical schemes is arithmetic complexity. Numerical methods have almost unlimited breadth of applications.

The present thesis titled "***Spline function approximation for solution of differential equations***" is concerned with the development of spline function approximation for the solution of certain class of two point boundary value problems.

The theory of spline functions is very active field of approximation theory, boundary value problems, singularly perturbed problems and partial differential equations, when numerical aspects are considered. In this thesis the parametric spline function approximation methods to obtain numerical solution of ordinary and partial differential equations which have physical significance have been investigated. Here, third order, system of third order, fourth order linear and nonlinear boundary value problems, fourth order singularly perturbed problem, sixth order linear boundary value problems and fourth order homogeneous and nonhomogeneous partial differential equations have been solved by using spline functions. To be able to deal effectively with such problems spline function containing a parameter is introduced. These are "parametric (nonpolynomial) splines" defined through the solution of a differential equation in each subinterval. The exact form of the spline depends upon the manner in which the parameter is introduced. The thesis consists of seven chapters followed by references useful for the development and application of the methods discussed.