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Title:	**Numerical Solution of Boundary Value Problems Using Spline Techniques**
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Abstract

Ordinary and Partial differential equations occur very frequently in many contexts of mathematics and science such as mathematical models of biological, chemical and physical phenomenon. In most of the cases, the analytical solution of the problem cannot be obtained, although the existence and uniqueness of the solution is easy to establish. Hence, numerical methods for solving boundary value problems in scientific and engineering problems are not only feasible but also very enticing. The availability of rich literature made it desirable to find out numerical solution of boundary value problems using spline techniques.

In this thesis we have developed generalized family of numerical methods which can solve linear as well as nonlinear boundary value problems and system of boundary value problems. We have solved second order singularly perturbed linear and non-linear boundary value problems with first derivative terms using non-polynomial spline. We have developed non-polynomial spline scheme for solving two-parameter singularly perturbed one dimensional parabolic partial differential equations and fourth order singularly perturbed linear boundary value problems with two types of boundary conditions. We have developed a non-polynomial cubic spline scheme for solving generalized system of second order linear and non-linear boundary value problems and non-polynomial quadratic spline scheme based

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on off-step points for solving higher even order such as fourth, sixth and eighth order boundary value problems. Higher order boundary value problems are first decomposed into system of second order boundary value problems and then solved using the scheme. We have also developed a non-polynomial cubic spline scheme for solving higher odd order such as ninth order boundary value problems. Higher odd order boundary value problems are first decomposed into system of third order boundary value problems and then solved using the scheme. In last, we have developed a non-polynomial quartic spline scheme for solving the twelfth order boundary value problems by decomposing into system of sixth order boundary value problems and then solved using the scheme. The developed methods are efficient and have been easily applicable on the boundary value problems.

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