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AN ADAPTIVE CUBIC SPLINE APPROACH FOR SOLVING A SECOND ORDER SINGULARLY PERTURBED BOUNDARY VALUE PROBLEM

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Abstract

The difference scheme using adaptive cubic spline for solving a self adjoint singularly perturbed two point boundary value problem of the form

$$\epsilon y'' = q(x)y + r(x)$$

$$y(a) = \alpha_0, y(b) = \alpha_1$$

is presented. Our scheme leads to a tri diagonal linear system. The convergence analysis is given which shows the methods is second and fourth order convergent depending upon the choice of parameters A_1, A_2, A_3 and A_4. Numerical illustrations are given to verify the theoretical analysis of our methods.

Key Words : *Adaptive cubic spline, Singularly perturbed boundary value problem, Boundary layers.*