An Extended Finite Difference Method for Singular Perturbation Problem on Non-Uniform Mesh

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Abstract: In this paper, a second order extended finite difference method on variable mesh is established for the solution of singularly perturbed boundary value problem. Discretization of the equation is done by extending the first and second order derivatives in the problem to the higher order finite differences on the nonuniform mesh. A tridiagonal solver is used to solve the equation efficiently. The proposed method is analyzed for convergence, and the method produces second-order uniform convergence. Numerical experiments are carried out to demonstrate the method. The maximum absolute errors and point wise errors with comparison to the other methods in the literature are shown to justify the method.

Keywords: *Extended finite difference method, Singularly perturbed boundary value problem, Non uniform mesh, Maximum absolute errors.*

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