A modified graded mesh and higher order finite element approximation for singular perturbation problems

A singularly perturbed convection diffusion problem is solved numerically using finite element method based on higher order polynomials. More precisely, we introduce a modified graded mesh generated using some implicitly defined functions. Higher order parameter uniform convergence is obtained in − weighted energy norm. Moreover, the error estimates obtained are optimal in the sense that they are free from logarithmic factor. A number of test examples are taken into account and a rigorous comparative analysis is presented. Moreover, we compare the proposed method with others found in the literature.