Non-Iterative Numerical Integration Method for Singular Perturbation Problems Exhibiting Internal and Twin Boundary Layers

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Abstract:

In this paper, a non-iterative numerical integration method is developed on a uniform mesh for a class of singularly perturbed two-point boundary value problems exhibiting internal and twin boundary layers. This method is non-iterative on a small deviating argument which converts the original second order boundary value problem to the first order differential equation with the deviating argument. By applying numerical integration method on first order differential equation, tri-diagonal scheme is obtained and is solved efficiently. This method is non-iterative and very easy to implement. Relative errors with L2-norm are presented to illustrate the proposed method.