

A Uniformly Convergent Numerical Method for a Coupled System of Singularly Perturbed Initial-Value Problems

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ABSTRACT

We consider a coupled system of two singularly perturbed nonlinear initial-value problems. The first derivative of each equation is multiplied by a distinct small parameter. The solution to this system exhibits overlapping layers. We construct a decomposition of the solution into regular and layer part. A classical finite difference scheme on appropriate piecewise-uniform mesh is used to solve the system numerically. It is proved that the scheme is almost first order convergent, uniformly in both the perturbation parameters. Numerical results are given in support of the theoretical results.

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