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ON CONVERGENCE OF DIFFERENCE SCHEMES FOR A SINGULARLY PERTURBED INITIAL-BOUNDARY VALUE PROBLEM WITH A NEUMANN CONDITION FOR A PARABOLIC EQUATION [1]

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For a singularly perturbed one-dimensional singularly perturbed parabolic equation with a perturbation parameter ε multiplying the highest-order derivative in the equation, $\varepsilon \in (0, 1]$, an initial-boundary value problem on a segment is considered with a Neumann condition on the boundary. In this problem, when ε tends to zero, boundary layers appear in a neighborhood of the lateral boundary. Standard finite difference schemes used to solve numerically this problem, do not converge ε-uniformly. The error in the grid solution grows unboundedly when the parameter $\varepsilon \to 0$.

In the talk, we study convergence of solutions for finite difference schemes on a standard and a special grids constructed with using monotone grid approximations [1, 2] of the differential problem. Results of numerical experiments which confirm the theoretical results are discussed. It is shown that the solution of the special difference scheme on a piecewise-uniform grid converges in the maximum norm ε-uniformly.

REFERENCES

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