

含两个小参数的抛物对流扩散方程的有限差分法

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摘要 研究含有两个小参数的奇异摄动抛物对流扩散方程的有限差分法.应用极大模原理和障碍函数技巧,可得方程的准确解及其各阶导数的界的估计.基于准确解的有关性态,构造分片一致的Shishkin型网格.

在Shishkin型网格上构建一个隐式迎风差分格式来进行数值求解,证得此差分策略是关于两个小参数都一致一阶收敛的.数值实验证实了理论结果的正确性.

关键词 [奇异摄动](#), [对流扩散](#), [有限差分法](#), [Shishkin 网格](#), [一致收敛](#).

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Analysis of a Finite Difference Scheme for a Parabolic Convection-Diffusion Problem with Two Small Parameters

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Abstract In this paper a parabolic convection-diffusion problem with two small parameters is considered. By using the maximum principle with carefully chosen barrier functions, we obtain the estimates of bounds for the exact solution and its derivatives. A fully implicit upwind finite difference scheme on a Shishkin-type mesh is used to solve the problem numerically. It is shown that the scheme converge almost first-order uniformly with respect to two small parameters. Numerical results support the theoretical results.

Key words [Singularly perturbed](#) [convection-diffusion](#) [finite difference](#) [Shishkin mesh](#) [uniform convergence](#).

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