

**Kopteva, Natalia**

**Error expansion for an upwind scheme applied to a two-dimensional convection-diffusion problem.** (English) [Zbl 1055.65119](#)  
SIAM J. Numer. Anal. 41, No. 5, 1851-1869 (2003).

This paper is concerned with a singularly perturbed convection-diffusion problem in a rectangular domain. The problem is solved using a first-order upwind finite difference scheme on a tensor-product piecewise-uniform Shishkin mesh with  $O(N)$  mesh points in each coordinate directions. An error analysis is discussed and numerical examples are proposed.

Reviewer: [Răzvan Răducanu \(Iași\)](#)

**MSC:**

- [65N15](#) Error bounds for boundary value problems involving PDEs
- [35J25](#) Boundary value problems for second-order elliptic equations
- [35B25](#) Singular perturbations in context of PDEs
- [65N06](#) Finite difference methods for boundary value problems involving PDEs
- [65N50](#) Mesh generation, refinement, and adaptive methods for boundary value problems involving PDEs

Cited in **14** Documents

**Keywords:**

convection-diffusion equation; upwind scheme; singular perturbation; error expansion; Richardson extrapolation; approximation of derivatives; Shishkin mesh; finite difference scheme; numerical examples

**Full Text:** [DOI](#)