Multiple Parameter Fitting Method for Singularly Perturbed Convection-Diffusion Problems

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Abstract: We consider a singularly perturbed parabolic differential equation of convection-diffusion type with two small parameters affecting the derivatives. Time discretization is done using Euler method and a two - point boundary value problem is obtained at each time level. A numerical scheme is constructed with reference to the nonstandard finite difference methodology of Mickens on uniform mesh. System of equations is solved using the tridiagonal solver. Numerical results give justification of the parameter-uniform convergence of the numerical approximations. We also consider numerical examples in comparison with other methods in the literature to justify the method.

Keywords*: Singularly perturbed parabolic differential equation, Time discretization, Non standard finite difference method.*

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