
DE058533326

Chadha, Naresh M.; Kopteva, Natalia

A robust grid equidistribution method for a one-dimensional singularly perturbed semilinear reaction-diffusion problem

IMA J. Numer. Anal. 31, No. 1, 188-211 (2011).

MSC Classification: 65L10

Keywords: one dimension; second order semilinear singularly perturbed equation; equidistribution method; second order accurate

Review text:

The authors consider a one dimensional second order semilinear singularly perturbed equation. The diffusion parameter is denoted by ε^2 . On an arbitrary mesh and thanks to a posteriori estimate, it remarked that it is possible to obtain second order accurate uniformly after a suitable choice for the mesh. To get this convenient mesh, the authors used the monitor function equidistribution. The aim of this paper is then to resolve two questions. The first question is to discuss the existence of a solution to equidistribution problem, and the second question is to suggest an algorithm which yields second order accurate uniformly w.r.t. the singular parameter for the discrete solution.

It is first established the existence of a solution to the equidistribution problem. This is done in a framework which can be applied to a more general equidistribution problem. An algorithm is suggested which yields second order accurate uniformly, when the equation is linear and under further mild assumptions, after $O(|\ln \varepsilon|/\ln N)$ iterations, where $N + 1$ is the number of mesh points.

This is pdfTeX, Version 3.141592-1.30.4-2.2 (Web2C 7.5.5) (format=pdfTeX 2008.10.24) 1 APR 2011 17:12
entering extended mode
%&-line parsing enabled.
**./preview-05853332.tex
(/preview-05853332.tex
(/zb-basic.tex (/data/zmath/texlive/texmf-dist/tex/amstex/base/amstex.tex

AmS-TeX- Version 2.2

Loading definitions for misc utility macros, page layout, accents/punctuation, line and page breaks, figures, comments, math spacing, fractions, smash commands, large operator symbols, integrals, operator names, multilevel sub/superscripts, matrices, multiline displays, continued fractions, compound symbols, various kinds of dots, special superscripts, \text, math font commands, \newsymbol, bold Greek and bold symbols, Euler fonts, math accents, roots, commutative diagrams, poor man's bold, syntax check, ... finished) (/data/zmath/texlive/texmf-dist/tex/plain/amsfonts/amssym.tex) (/data/zmath/texlive/texmf-dist/tex/plain/amsfonts/cyracc.def)
(./zb-preview.tex) [1{/data/zmath/texlive/texmf-var/fonts/map/pdfTeX/updmap/pdfTeX.map}])</data/zmath/texlive/texmf-dist/fonts/typel/bluesky/cm/cmsy10.pfb></data/zmath/texlive/texmf-dist/fonts/typel/bluesky/cm/cmr7.pfb></data/zmath/texlive/texmf-dist/fonts/typel/bluesky/cm/cmmi10.pfb></data/zmath/texlive/texmf-dist/fonts/typel/bluesky/cm/cmti10.pfb></data/zmath/texlive/texmf-dist/fonts/typel/bluesky/cm/cmr10.pfb></data/zmath/texlive/texmf-dist/fonts/typel/bluesky/cm/cmbx10.pfb>
Output written on preview-05853332.pdf (1 page, 36146 bytes).