DE059475076
Droniou, Jérôme; le Potier, Christophe
Construction and convergence study of schemes preserving the elliptic local maximum principle
SIAM J. Numer. Anal. 49, No. 2, 459-490 (2011).

MSC Classification: 65N08 65N12

Keywords: second order elliptic equations; anisotropic heterogeneous diffusion; finite volume method; local maximum and minimum principles

Review text:

The authors consider the finite volume approximation of diffusion equations on very generic meshes. They construct a nonlinear finite volume scheme which satisfies the minimum and maximum principles and is non oscillating. The mentioned scheme is based on a nonlinear combination of linear fluxes, and can be constructed in two or three dimensions and in the presence of strong anisotropy and heterogeneity. An existence result of a solution to the scheme is proved using Brouwer's topological degree.

To prove the convergence of the approximates solutions towards the exact solution, a discrete compactness property is stated. Under a coercivity property on the fluxes, it is proved that the approximates solutions converge towards the exact solution in L^q for all $q < \frac{2d}{d-2}$.

Several numerical tests are presented to support theoretical results and to understand how some parameters in the scheme should be chosen.

```
This is pdfeTeXk, Version 3.141592-1.30.4-2.2 (Web2C 7.5.5) (format=pdftex 2008.10.24)  16 OCT 2011 18:23
entering extended mode
 %&-line parsing enabled.
**./preview-05947507.tex
(./preview-05947507.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 command
s, large operator symbols, integrals, operator names, multilevel sub/superscrip
ts, matrices, multiline displays, continued fractions, compound symbols, variou
s kinds of dots, special superscripts, \text, math font commands, \newsymbol, b
old Greek and bold symbols, Euler fonts, math accents, roots, commutative diagr
ams, poor man's bold, syntax check, ... finished) (/data/zmath/texlive/texmf-di
st/tex/plain/amsfonts/amssym.tex) (/data/zmath/texlive/texmf-dist/tex/plain/ams
fonts/cyracc.def))
(./zb-preview.tex) [1{/data/zmath/texlive/texmf-var/fonts/map/pdftex/updmap/pdf
tex.map}] )</data/zmath/texlive/texmf-dist/fonts/type1/bluesky/cm/cmsy7.pfb></d
ata/zmath/texlive/texmf-dist/fonts/type1/bluesky/cm/cmr7.pfb></data/zmath/texli
ve/texmf-dist/fonts/type1/bluesky/cm/cmmi7.pfb></data/zmath/texlive/texmf-dist/
fonts/type1/bluesky/cm/cmmi10.pfb></data/zmath/texlive/texmf-dist/fonts/type1/b
luesky/cm/cmti10.pfb></data/zmath/texlive/texmf-dist/fonts/type1/bluesky/cm/cmr
10.pfb></data/zmath/texlive/texmf-dist/fonts/type1/bluesky/cm/cmbx10.pfb>
Output written on preview-05947507.pdf (1 page, 39380 bytes).
```