Benchmark on anisotropic problems

Insert title - **(December 8th)**

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ABSTRACT. *Insert abstract*

KEYWORDS: *Anisotropy benchmark, finite volume....*

1. Presentation of the scheme

2. Numerical results

• **Test 1.1 Mild anisotropy,** $u(x,y) = 16x(1-x)y(1-y)$**,** $\min = 0$, $\max = 1$**, regular triangular mesh,** `mesh1`

i	nunkw	nnmat	sumflux	erl2	ergrad	ratiol2	ratiograd
1							
2							
3							
4							
5							
6							
7							

ocvl2$=???$, **ocvgradl2**$=???$.

i	erflx0	erflx1	erfly0	erfly1	erflm	umin	umax
1							
2							
3							
4							
5							
6							
7							

• **Test 1.1 Mild anisotropy,** $u(x,y) = 16x(1-x)y(1-y)$**,** $\min = 0$, $\max = 1$**, coarse (C) and fine (F) distorted quadrangular meshes,** `mesh4_1` **and** `mesh4_2`

grid	nunkw	nnmat	sumflux	erl2	ergrad
C					
F					

grid	erflx0	erflx1	erfly0	erfly1	erflm	umin	umax
C							
F							

• **Test 1.2 Mild anisotropy,** $u(x,y) = \sin((1-x)(1-y)) + (1-x)^3(1-y)^2$**,** $\min = 0$, $\max = 1 + \sin 1$**, regular triangular mesh,** `mesh1`

i	nunkw	nnmat	sumflux	erl2	ergrad	ratiol2	ratiograd
1							
2							
3							
4							
5							
6							
7							

ocvl2$=???$, **ocvgradl2**$=???$.

i	erflx0	erflx1	erfly0	erfly1	erflm	umin	umax
1							
2							
3							
4							
5							
6							
7							

• **Test 1.2 Mild anisotropy,** $u(x,y) = \sin((1-x)(1-y)) + (1-x)^3(1-y)^2$**,** $\min = 0$, $\max = 1 + \sin 1$**, locally refined nonconforming rectangular mesh,** `mesh3`

i	nunkw	nnmat	sumflux	erl2	ergrad	ratiol2	ratiograd
1							
2							
3							
4							
5							

ocvl2$=???$, **ocvgradl2**$=???$.

i	erflx0	erflx1	erfly0	erfly1	erflm	umin	umax
1							
2							
3							
4							
5							

• **Test 2 Numerical locking,** $u(x,y) = \sin(2\pi x)e^{-2\pi\sqrt{\frac{1}{\delta}}y}$, $\delta = 10^5$**,**
$\min = -1$, $\max = 1$**, regular triangular mesh,** `mesh1`

i	nunkw	nnmat	sumflux	erl2	ergrad	ratiol2	ratiograd
1							
2							
3							
4							
5							
6							
7							

ocvl2=???, **ocvgradl2**=???.

i	erflx0	erflx1	fluy0	fluy1	erflm	umin	umax
1							
2							
3							
4							
5							
6							
7							

• **Test 2 Numerical locking,** $u(x,y) = \sin(2\pi x)e^{-2\pi\sqrt{\frac{1}{\delta}}y}$, $\delta = 10^6$**,**
$\min = -1$, $\max = 1$**, regular triangular mesh,** `mesh1`

i	nunkw	nnmat	sumflux	erl2	ergrad	ratiol2	ratiograd
1							
2							
3							
4							
5							
6							
7							

ocvl2=???, **ocvgradl2**=???.

i	erflx0	erflx1	fluy0	fluy1	erflm	umin	umax
1							
2							
3							
4							
5							
6							
7							

• **Test 3 Oblique flow,** $\min = 0,\ \max = 1$**, uniform rectangular mesh,** `mesh2`

Description of the user chosen reference mesh (and step size) if available.

i	nunkw	nnmat	sumflux	umin	umax
1					
2					
3					
4					
5					
ref					

i	flux0	flux1	fluy0	fluy1	ener1	ener2	eren
1							
2							
3							
4							
5							
ref							

INSERT approximate solutions for mesh2_i for i=2 , i=3 , i=4 , if available.

• **Test 4 Vertical fault,** $\min = 0.,\ \max = 1.$**, non conforming rectangular mesh,** `mesh5`

Description of the user chosen reference mesh (and step size) if available.

i	nunkw	nnmat	sumflux	umin	umax
1					
reg					
ref					

i	flux0	flux1	fluy0	fluy1	ener1	ener2	eren
1 reg ref							

INSERT the figure of approximate solution if available.

• **Test 5 Heterogeneous rotating anisotropy,** $\min = 0,\ \max = 1$ **, uniform rectangular mesh,** `mesh2`

i	nunkw	nnmat	sumflux	erl2	ergrad	ratiol2	ratiograd
1 2 3 4 5							

ocvl2$=???,$ **ocvgradl2**$=???.$

i	erflx0	erflx1	erfly0	erfly1	erflm	umin	umax
1 2 3 4 5							

• **Test 6 Oblique drain,** $\min = -1.2,\ \max = 0$**, coarse (C) and fine (F) oblique meshes,** `mesh6` **and** `mesh7`

grid	nunkw	nnmat	sumflux	erl2	ergrad
C F					

grid	erflx0	erflx1	erfly0	erfly1	erflm	umin	umax
C F							

• **Test 7 Oblique barrier,** $\min = -5.575,\ \max = 0.575$**, coarse oblique mesh** `mesh6`

nunkw	nnmat	sumflux	erl2	ergrad

erflx0	erflx1	erfly0	erfly1	erflm	umin	umax

• **Test 8 Perturbed parallelograms,** $\min = 0$**, perturbed parallelograms mesh** `mesh8`

nunkw	nnmat	sumflux	umin	umax

flux0	flux1	fluy0	fluy1

• **Test 9 Anisotropy with wells,** $\min = 0,\ \max = 1.$**, square uniform grid** `mesh9`

nunkw	nnmat	sumflux	umin	umax

3. Comments on the results

INSERT Bibliography []