coreform IGA
for Abaqus

Stress concentration in a thin plate with hole

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1 Objective

Verify the ability of Coreform IGA for Abaqus to predict stress concentrations on a classic linear-elastic stress-concentration problem: a uniaxially-loaded coupon with a central circular hole. The quantity of interest is the peak stress at the hole edge, whose *accepted* value is the stress-concentration factor tabulated by Roark[1]. We also compare the transverse stress and displacement profiles along the line probe against a reference body-fitted Abaqus solution.

2 Geometry

A thin rectangular coupon with a central circular hole as shown in (Figure 1) and parameters provided in Table 1. Verification quantities are sampled along the shortest span from the hole edge to the free edge.

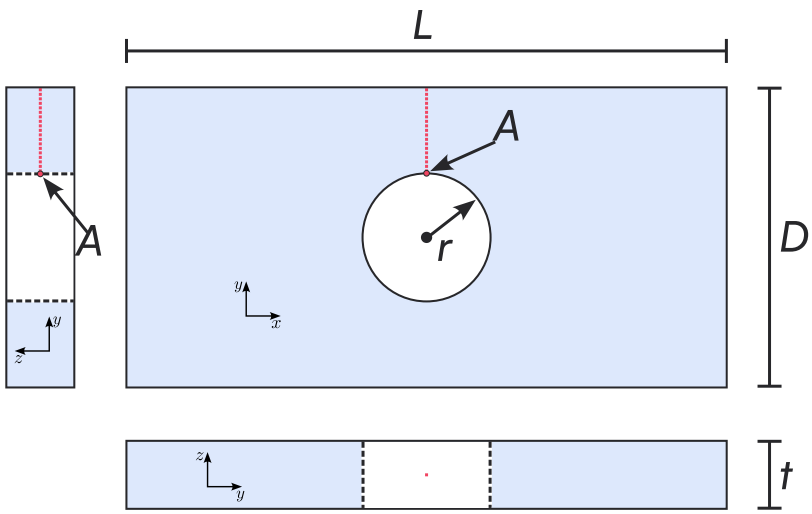


Figure 1: Coupon geometry: a plate of length L, width D, thickness t, with a central hole of radius r. The dashed red line indicates the location of a line probe that samples our quantities of interest. The annotated point A indicates the location of expected maximum principal stress, used to evaluate the peak stress in our analysis.

Table 1: Geometric parameters.

Quantity	Symbol	Value
Coupon length	L	200
Coupon width	D	40
Hole radius	r	10
Thickness	t	1

3 Material

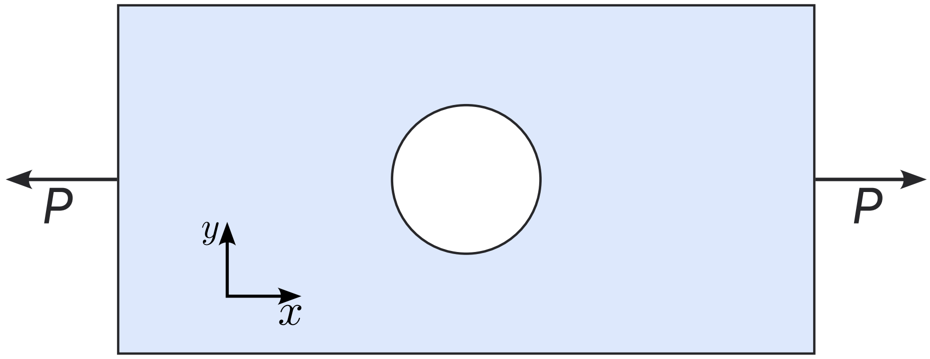
The coupon is a homogeneous, isotropic, linear-elastic material with properties given in (Table 2).

Table 2: Material properties.

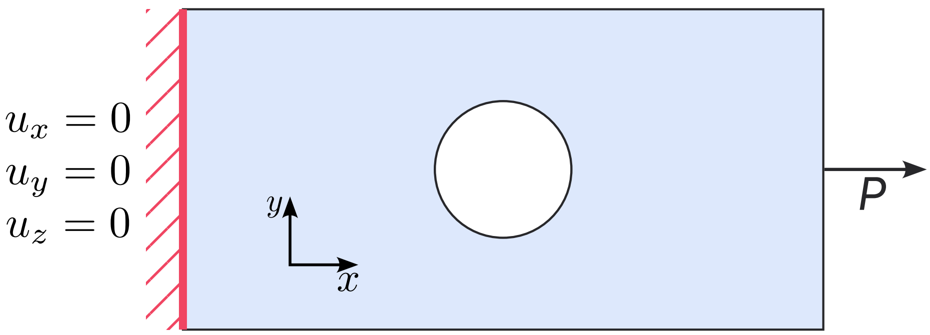
Property	Symbol	Value
Young's modulus	E	1
Poisson's ratio	ν	0
Mass density	ρ	0

4 Loading & boundary conditions

The coupon is loaded in uniaxial tension by a uniform pressure on the right face (Table 3), with the left face pinned as depicted in Figure 2. The load is chosen to be small, compared to the Young's modulus, so that the response is assumed linear.



(a) Idealized boundary conditions.



(b) Boundary conditions as implemented in Abaqus and Coreform IGA.

Figure 2: Boundary conditions on the coupon: (a) the idealized problem statement with uniform-pressure applied on both ends, and (b) the equivalent conditions as actually implemented in our finite element models.

Table 3: Applied loading.

Quantity	Symbol	Value
Applied end pressure	P	1.00×10^{-6}

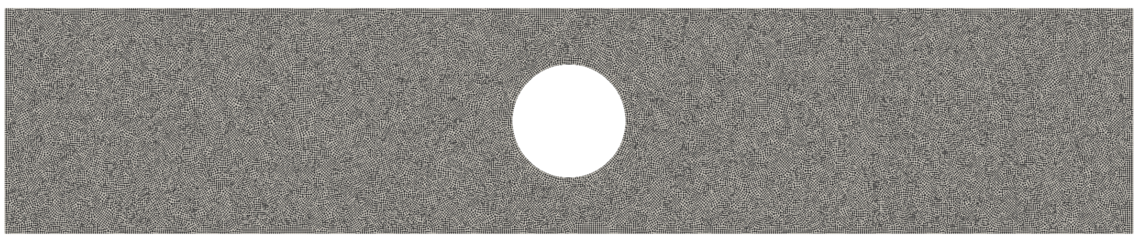
5 Mesh & discretization

Coreform IGA discretizes the coupon with immersed, trimmed U-splines: a structured background spline is trimmed to the coupon-with-hole geometry rather than body-fitting a mesh to it. We run an h/p refinement study — background element size $h = 6/2^k$ for $k = 0, ..., 4$ at polynomial degrees $p = 1$, 2, and 3. Per-mesh element, node, and degree-of-freedom counts are reported in Section 8.

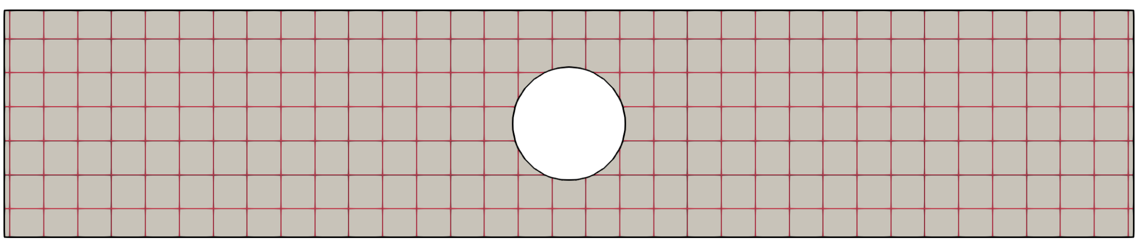
The tabs below show the trimmed immersed mesh at each background element size h (the mesh is shared by all degrees p), rendered from the run's IGA results database: trimmed Bezier element edges (carnation) on the CAD surface, CAD edges in black. The Reference tab shows the body-fitted Abaqus mesh, rendered from the VTU the reference test exports. The first group views the full coupon; the second is a detail of the nominal section, from the top of the hole to the top of the coupon.

Full coupon

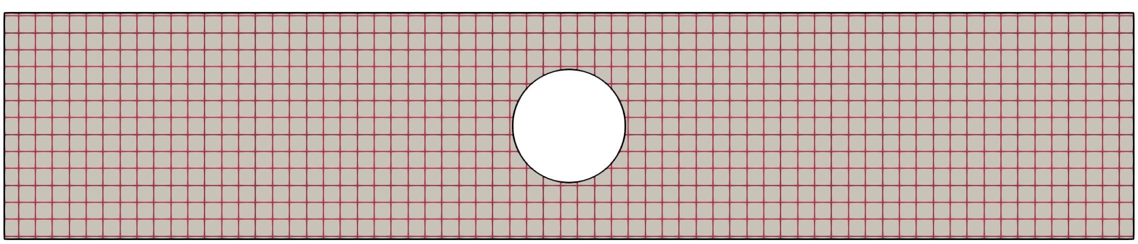
5.0.a Reference



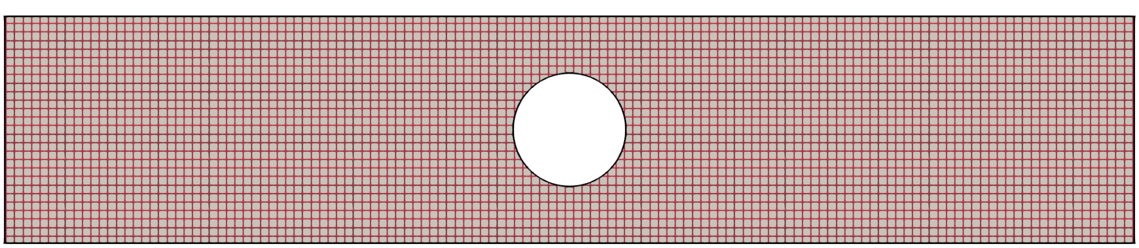
5.0.b h=6



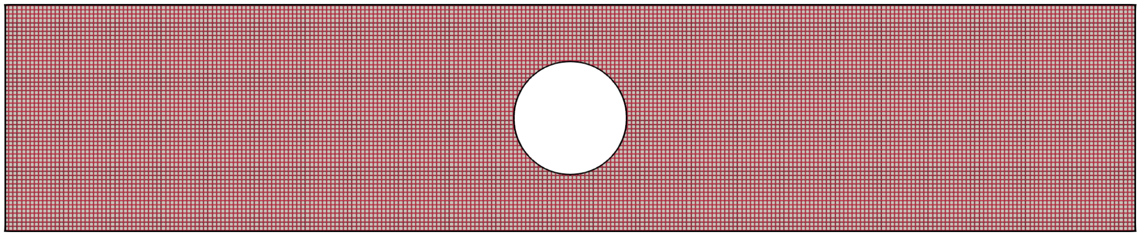
5.0.c h=3



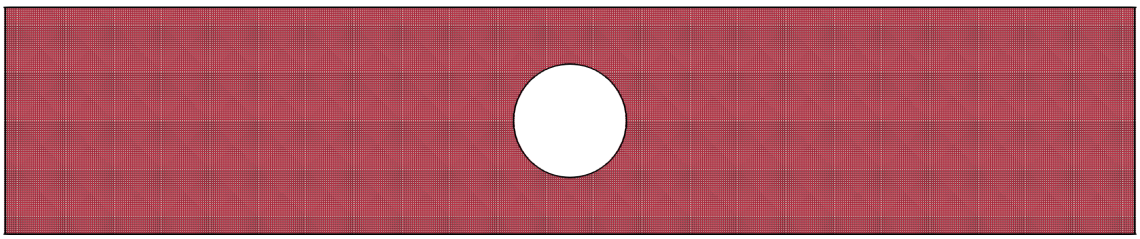
5.0.d h=1.5



5.0.e h=0.75

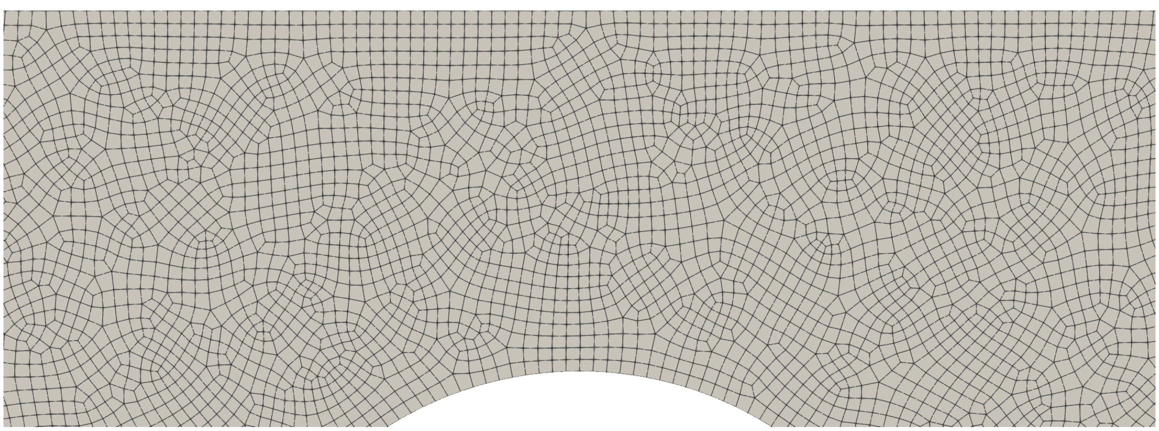


5.0.f h=0.375

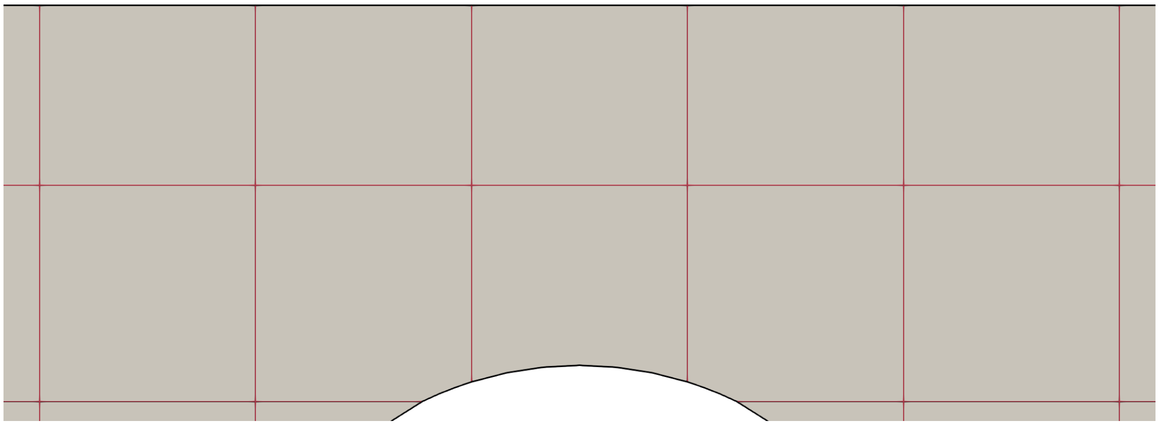


Nominal-section detail

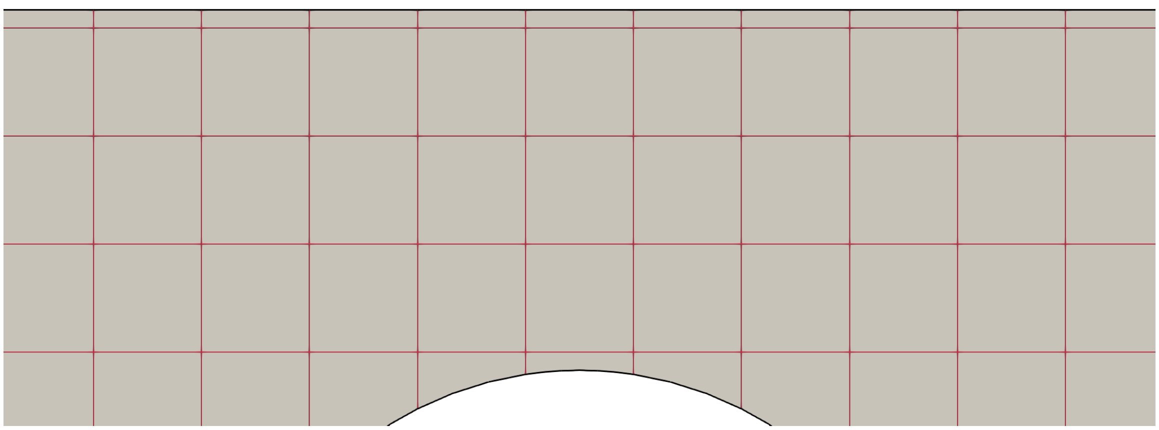
5.0.g Reference



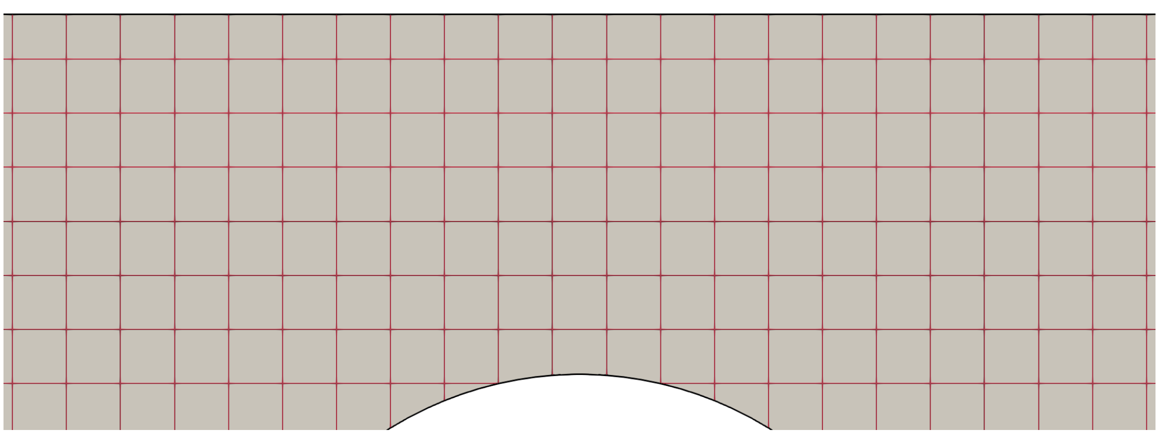
5.0.h h=6



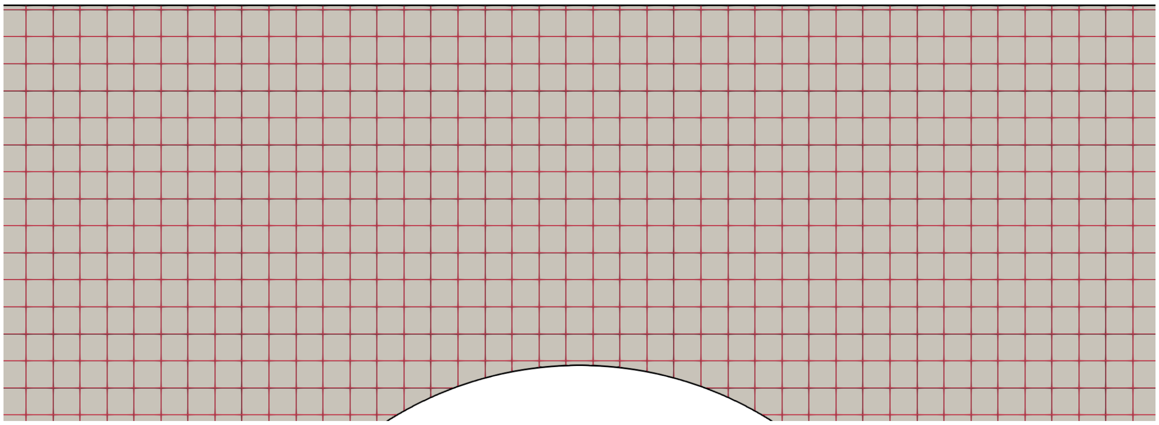
5.0.i h=3



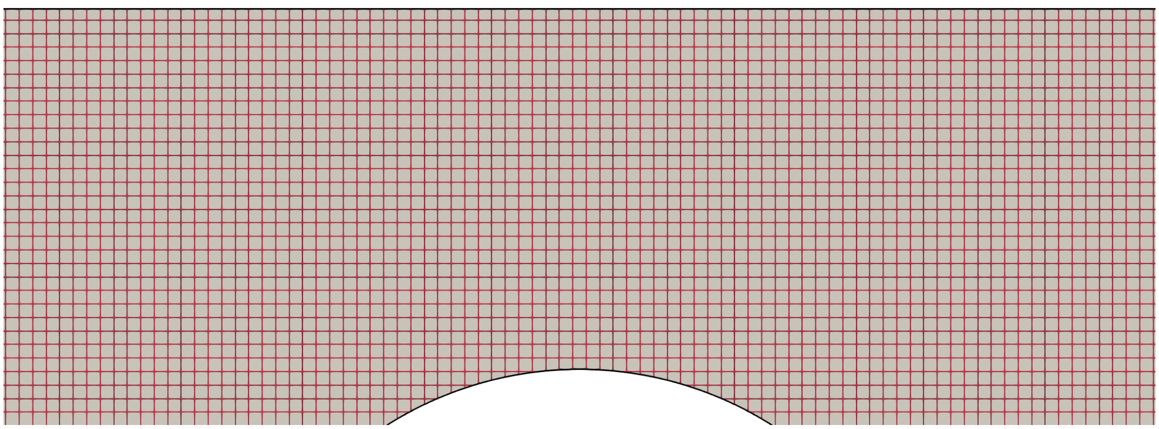
5.0.j h=1.5



5.0.k h=0.75



5.0.l h=0.375



6 Reference & accepted solutions

Roark's *Formulas for Stress and Strain*, Table 17.1 case 7a, gives the accepted stress-concentration factor for the net section,

$$K_t = \sum_{i=0}^{3} C_i \left(\frac{2r}{D}\right)^i,$$

with the polynomial coefficients C_i listed in Table 4. The nominal stress on the net section is

$$\sigma_{\text{nom}} = \frac{P\,tD}{t\,(D-2r)},$$

so the accepted peak max-principal stress at the hole edge is

$$\sigma_{\max} = K_t \, \sigma_{\text{nom}}.$$

Its evaluated value is reported alongside the reference solve in Table 5.

Table 4: Roark K_t polynomial coefficients.

Coefficient	Value
C_0	3.00
C_1	-3.13
C_2	3.66
C_3	-1.53

The reference solution is a normal Abaqus analysis of the same coupon using a dense, body-fitted mesh of quadratic elements. Its transverse stress and displacement profiles along the line probe are the comparison for the field quantities, and its peak max-principal stress at the hole edge provides an independent numerical estimate to sit alongside Roark's accepted value (Table 5). Being itself a numerical approximation rather than the exact solution, the reference is not treated as ground truth — a distinction that matters for the convergence study (Section 7.5).

Table 5: Accepted and reference peak max-principal stress at the hole edge.

Source	peak $\sigma_{\max}$
Accepted (Roark K_t)	4.32×10^{-6}
Reference (body-fitted Abaqus)	4.35×10^{-6}

7 Results

7.1 Quantities of interest

For each mesh the peak stress is compared against both the accepted Roark value and the reference solve; the transverse stress and displacement profiles are compared (relative L^2) against the reference.

7.1.a h=6, p=1

Quantity	Coreform IGA	vs Roark	vs reference
peak $\sigma_{\max}$	3.34×10^{-6}	22.7%	23.2%
transverse stress rel. L^2	—	—	11.5%
u_x profile rel. L^2	—	—	2.15%
u_y profile rel. L^2	—	—	35%

7.1.b h=3, p=1

Quantity	Coreform IGA	vs Roark	vs reference
peak $\sigma_{\max}$	4.18×10^{-6}	3.28%	3.96%
transverse stress rel. L^2	—	—	3.17%
u_x profile rel. L^2	—	—	0.576%
u_y profile rel. L^2	—	—	9.72%

7.1.c h=1.5, p=1

Quantity	Coreform IGA	vs Roark	vs reference
peak $\sigma_{\max}$	4.25×10^{-6}	1.67%	2.36%
transverse stress rel. L^2	—	—	0.852%
u_x profile rel. L^2	—	—	0.169%
u_y profile rel. L^2	—	—	3.01%

7.1.d h=0.75, p=1

Quantity	Coreform IGA	vs Roark	vs reference
peak $\sigma_{\max}$	4.31×10^{-6}	0.108%	0.808%
transverse stress rel. L^2	—	—	0.296%
u_x profile rel. L^2	—	—	0.0425%
u_y profile rel. L^2	—	—	0.689%

7.1.e h=0.375, p=1

Quantity	Coreform IGA	vs Roark	vs reference
peak $\sigma_{\max}$	4.34×10^{-6}	0.541%	0.163%
transverse stress rel. L^2	—	—	0.0975%
u_x profile rel. L^2	—	—	0.0163%
u_y profile rel. L^2	—	—	0.195%

7.1.f h=6, p=2

Quantity	Coreform IGA	vs Roark	vs reference
peak $\sigma_{\max}$	3.26×10^{-6}	24.5%	25.1%
transverse stress rel. L^2	—	—	14.1%

Quantity	Coreform IGA	vs Roark	vs reference
u_x profile rel. L^2	—	—	0.597%
u_y profile rel. L^2	—	—	9.55%

7.1.g h=3, p=2

Quantity	Coreform IGA	vs Roark	vs reference
peak $\sigma_{\max}$	4.08×10^{-6}	5.61%	6.27%
transverse stress rel. L^2	—	—	2.94%
u_x profile rel. L^2	—	—	0.0428%
u_y profile rel. L^2	—	—	0.572%

7.1.h h=1.5, p=2

Quantity	Coreform IGA	vs Roark	vs reference
peak $\sigma_{\max}$	4.31×10^{-6}	0.258%	0.957%
transverse stress rel. L^2	—	—	0.535%
u_x profile rel. L^2	—	—	0.0142%
u_y profile rel. L^2	—	—	0.0701%

7.1.i h=0.75, p=2

Quantity	Coreform IGA	vs Roark	vs reference
peak $\sigma_{\max}$	4.33×10^{-6}	0.245%	0.457%
transverse stress rel. L^2	—	—	0.215%
u_x profile rel. L^2	—	—	0.0114%
u_y profile rel. L^2	—	—	0.0286%

7.1.j h=0.375, p=2

Quantity	Coreform IGA	vs Roark	vs reference
peak $\sigma_{\max}$	4.35×10^{-6}	0.723%	0.0173%
transverse stress rel. L^2	—	—	0.0912%
u_x profile rel. L^2	—	—	0.0109%
u_y profile rel. L^2	—	—	0.0164%

7.1.k h=6, p=3

Quantity	Coreform IGA	vs Roark	vs reference
peak $\sigma_{\max}$	4.01×10^{-6}	7.21%	7.86%
transverse stress rel. L^2	—	—	3.25%
u_x profile rel. L^2	—	—	0.129%
u_y profile rel. L^2	—	—	3.33%

7.1.l h=3, p=3

Quantity	Coreform IGA	vs Roark	vs reference
peak $\sigma_{\max}$	4.39×10^{-6}	1.77%	1.06%
transverse stress rel. L^2	—	—	0.52%
u_x profile rel. L^2	—	—	0.0106%
u_y profile rel. L^2	—	—	0.125%

7.1.m h=1.5, p=3

Quantity	Coreform IGA	vs Roark	vs reference
peak $\sigma_{\max}$	4.36×10^{-6}	0.879%	0.172%
transverse stress rel. L^2	—	—	0.0752%
u_x profile rel. L^2	—	—	0.0128%
u_y profile rel. L^2	—	—	0.0561%

7.1.n h=0.75, p=3

Quantity	Coreform IGA	vs Roark	vs reference
peak $\sigma_{\max}$	4.35×10^{-6}	0.736%	0.0298%
transverse stress rel. L^2	—	—	0.067%
u_x profile rel. L^2	—	—	0.0111%
u_y profile rel. L^2	—	—	0.0239%

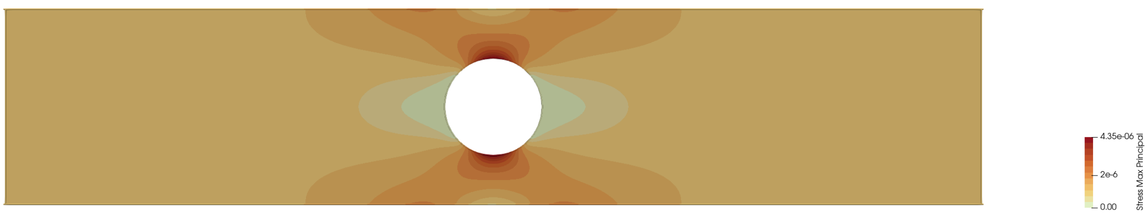
7.1.o h=0.375, p=3

Quantity	Coreform IGA	vs Roark	vs reference
peak $\sigma_{\max}$	4.35×10^{-6}	0.653%	0.0528%

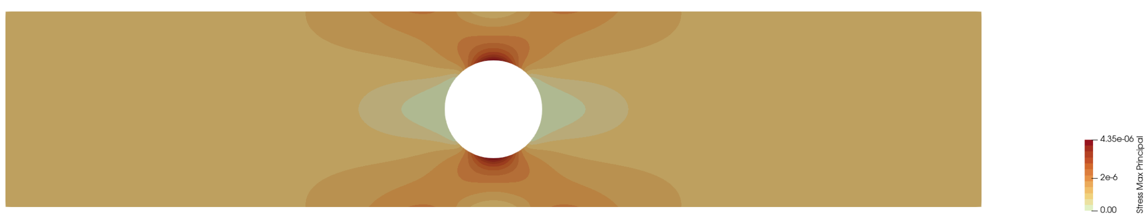
Quantity	Coreform IGA	vs Roark	vs reference
transverse stress rel. L^2	—	—	0.0742%
u_x profile rel. L^2	—	—	0.0109%
u_y profile rel. L^2	—	—	0.0197%

7.2 Stress field

Figure 3 compares the maximum-principal-stress field between the immersed IGA solution on the finest $p = 2$ mesh (Figure 3a) and the body-fitted Abaqus reference solve (Figure 3b). Both are rendered in ParaView on a shared color scale — the Abaqus fields come from the VTU that the reference test case exports from its ODB — so the contours compare directly.



(a) Immersed IGA solution (case `immersed_h4p2`, $h = 0.375$, $p = 2$).



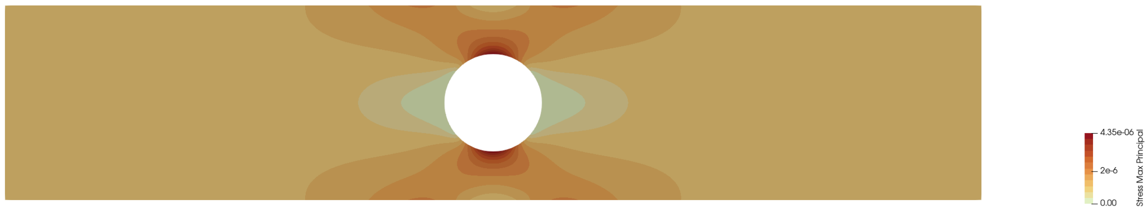
(b) Body-fitted Abaqus reference solution.

Figure 3: Maximum principal stress on a shared color scale.

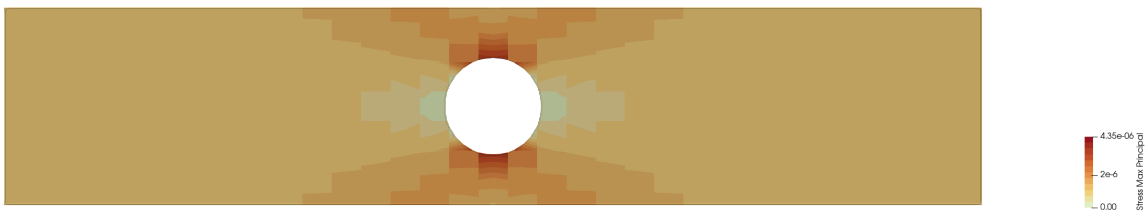
The tabs below extend the comparison to every case in the study, on the same shared color scale — flip between the Reference tab and any IGA case to compare contours directly.

Full coupon

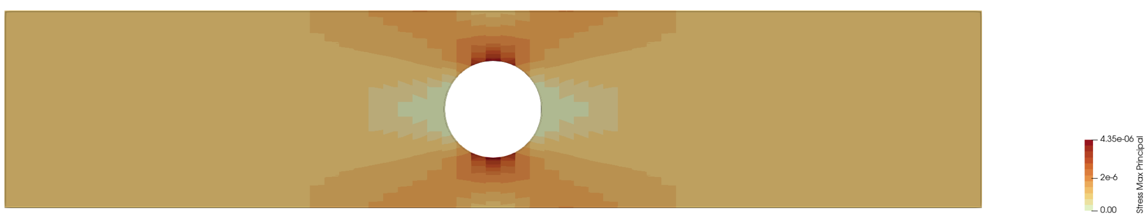
7.2.a Reference



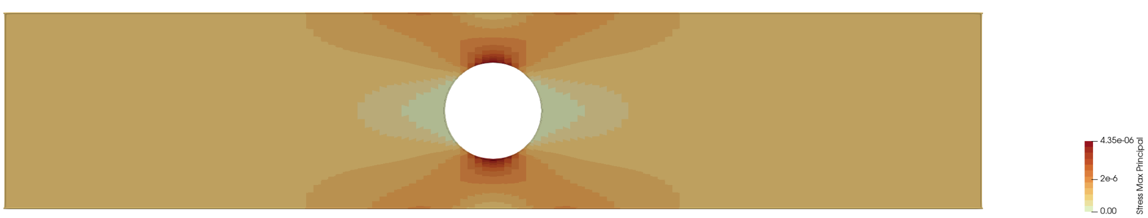
7.2.b h=6, p=1



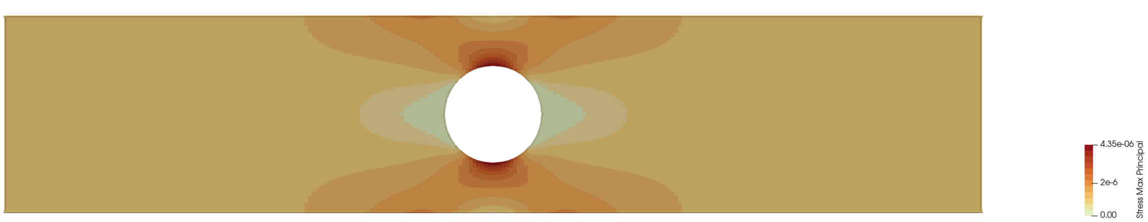
7.2.c h=3, p=1



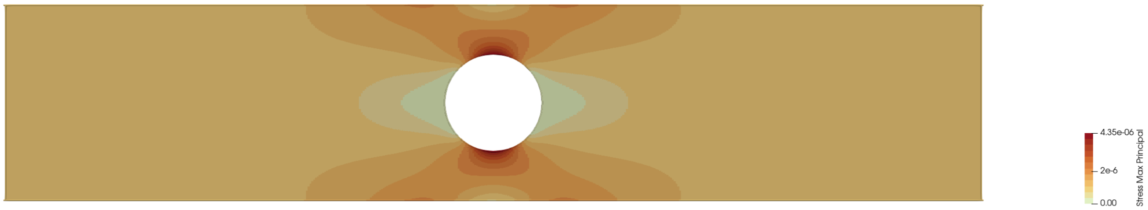
7.2.d h=1.5, p=1



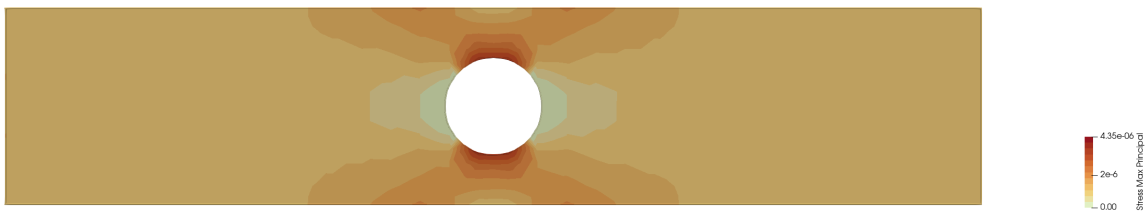
7.2.e h=0.75, p=1



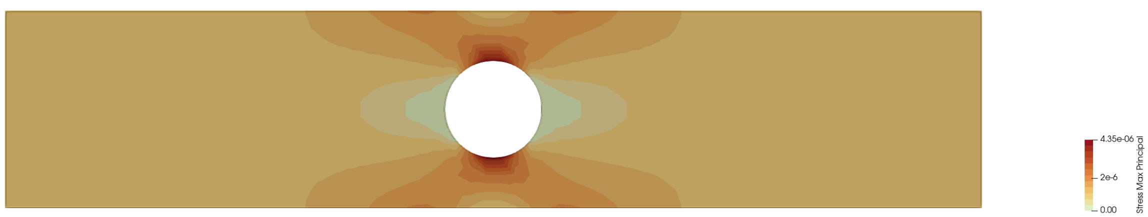
7.2.f h=0.375, p=1



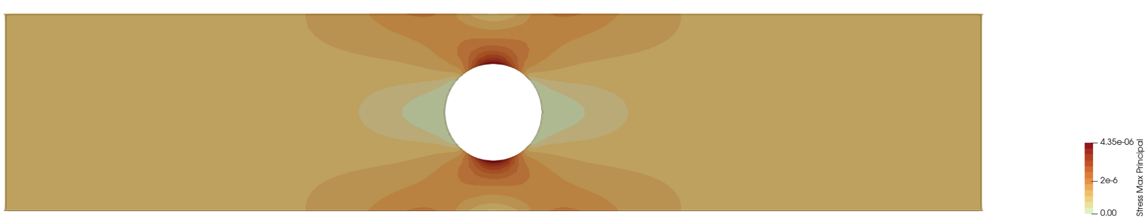
7.2.g h=6, p=2



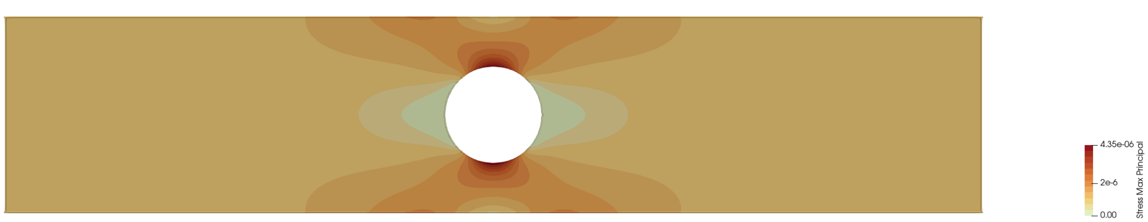
7.2.h h=3, p=2



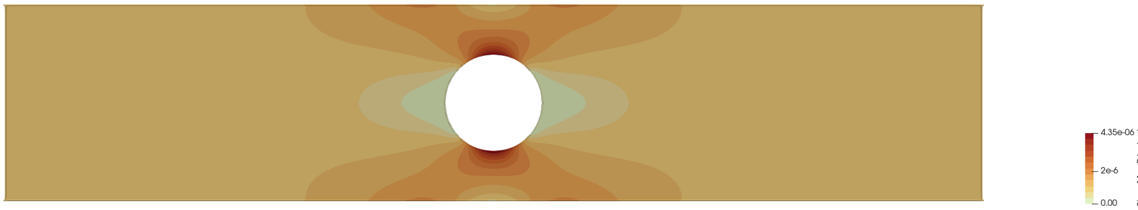
7.2.i h=1.5, p=2



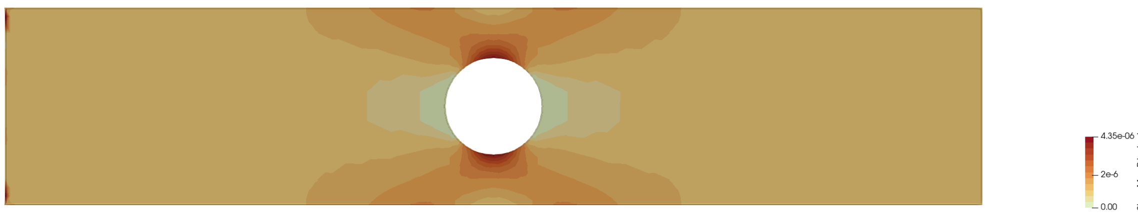
7.2.j h=0.75, p=2



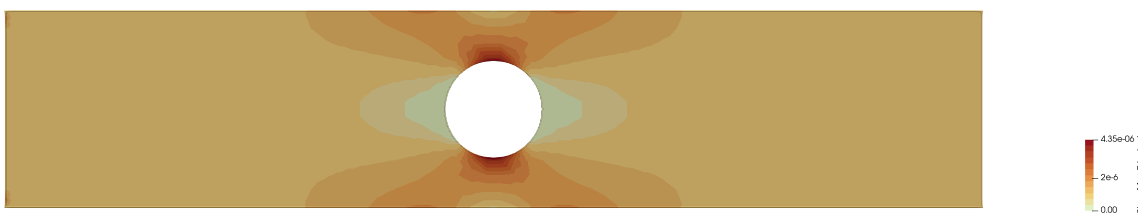
7.2.k h=0.375, p=2



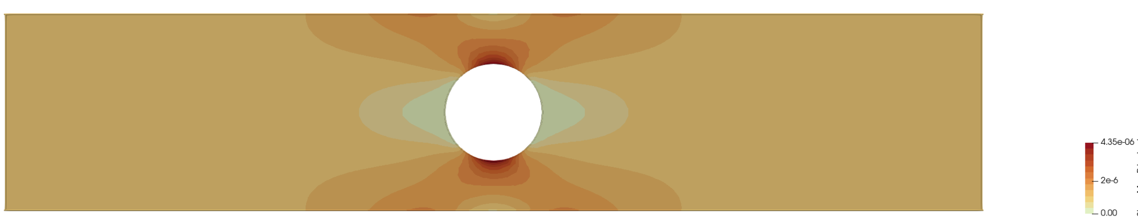
7.2.l h=6, p=3



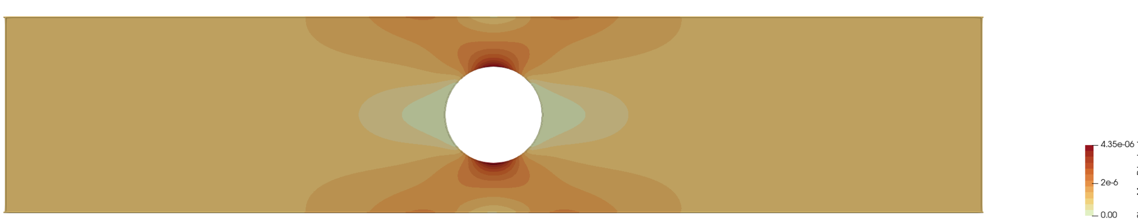
7.2.m h=3, p=3



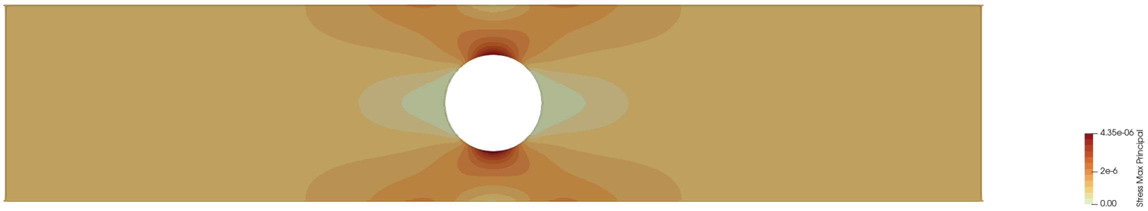
7.2.n h=1.5, p=3



7.2.o h=0.75, p=3

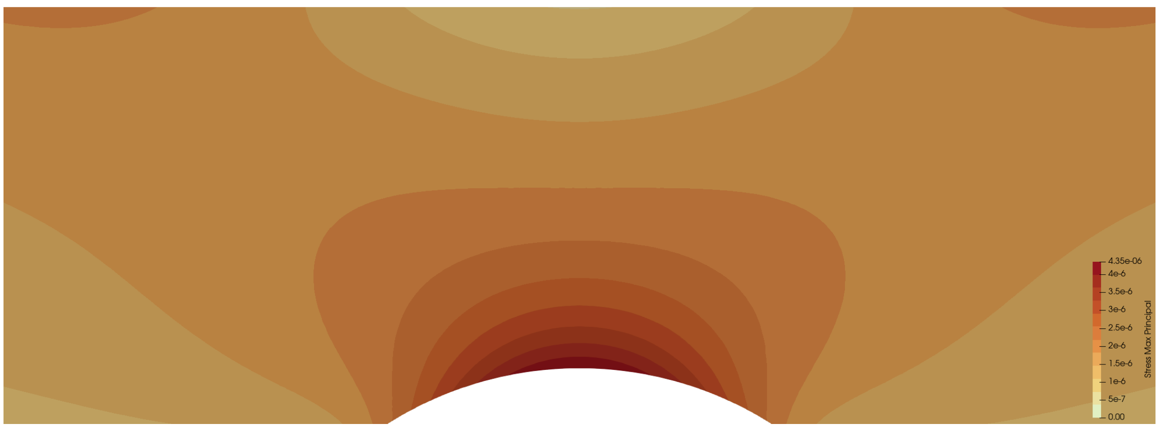


7.2.p h=0.375, p=3

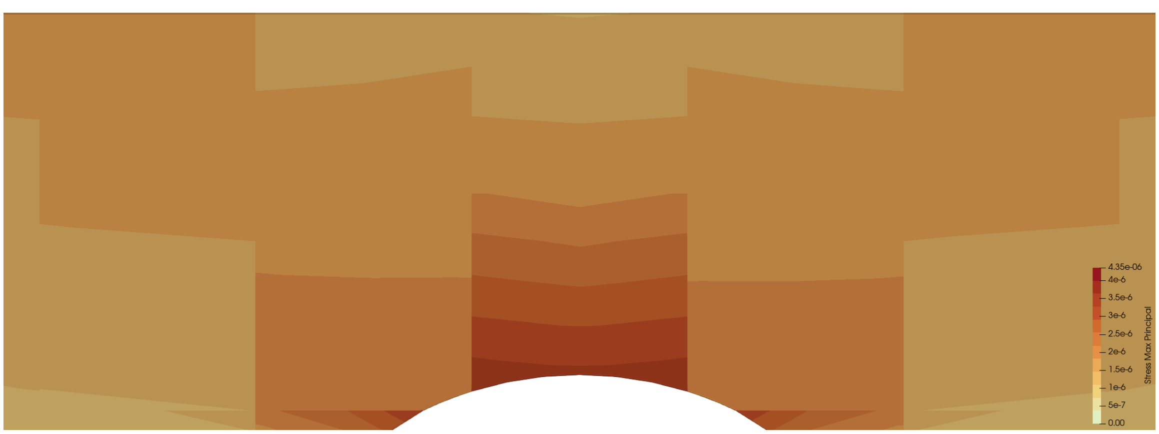


Nominal-section detail

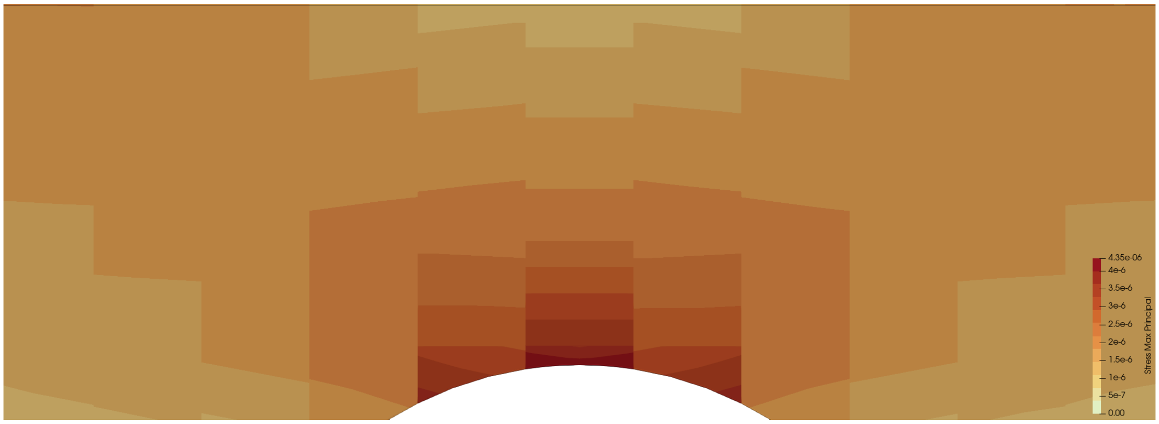
7.2.q Reference



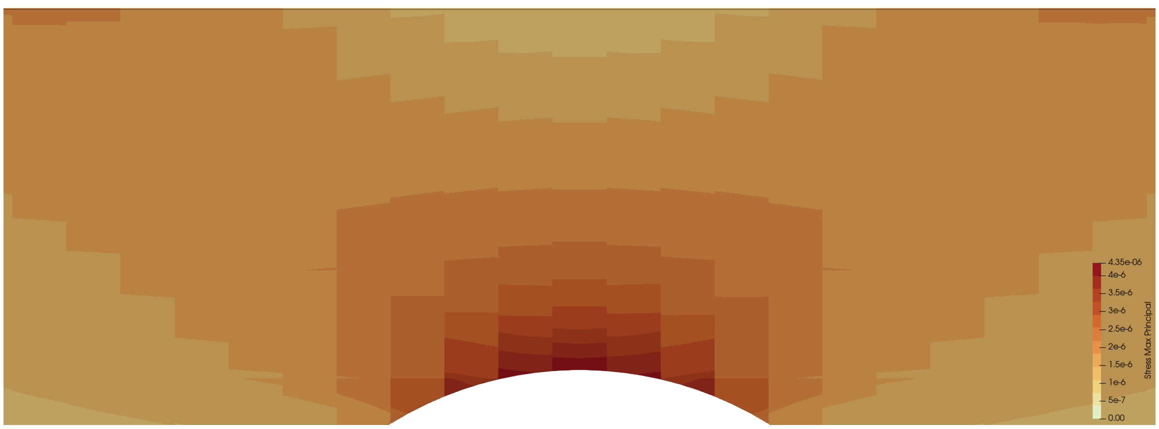
7.2.r h=6, p=1



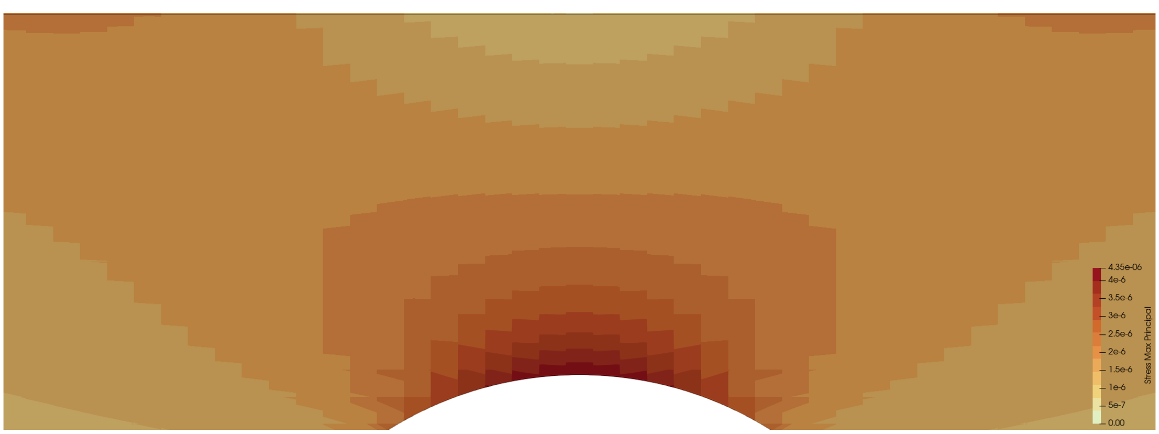
7.2.s h=3, p=1



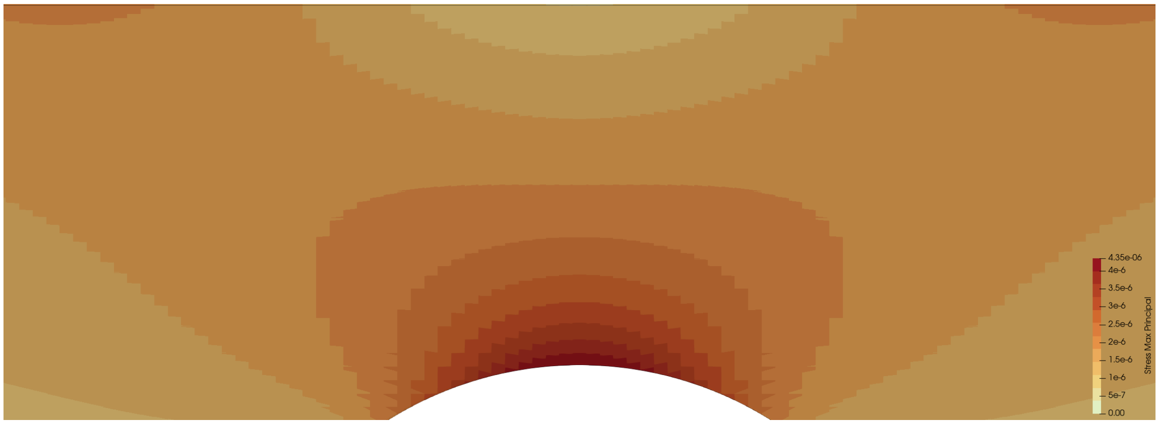
7.2.t h=1.5, p=1



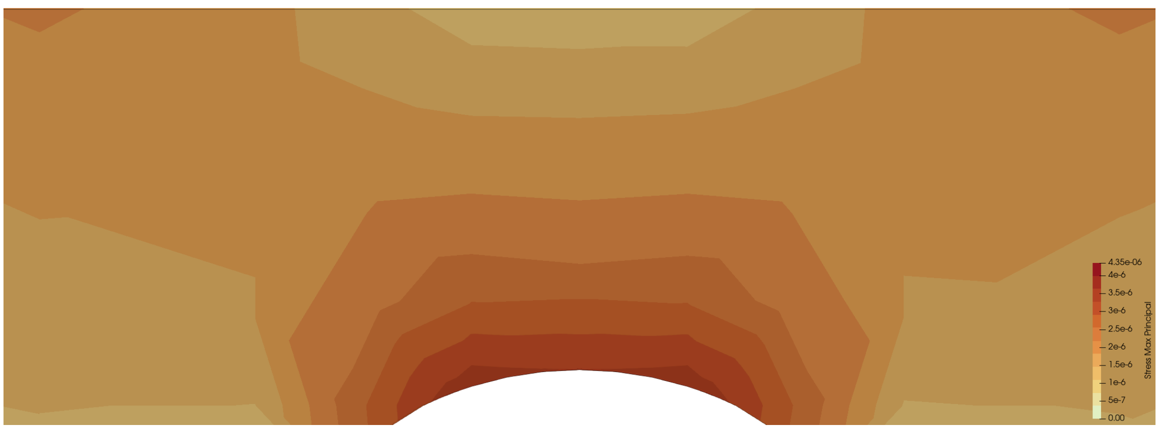
7.2.u h=0.75, p=1



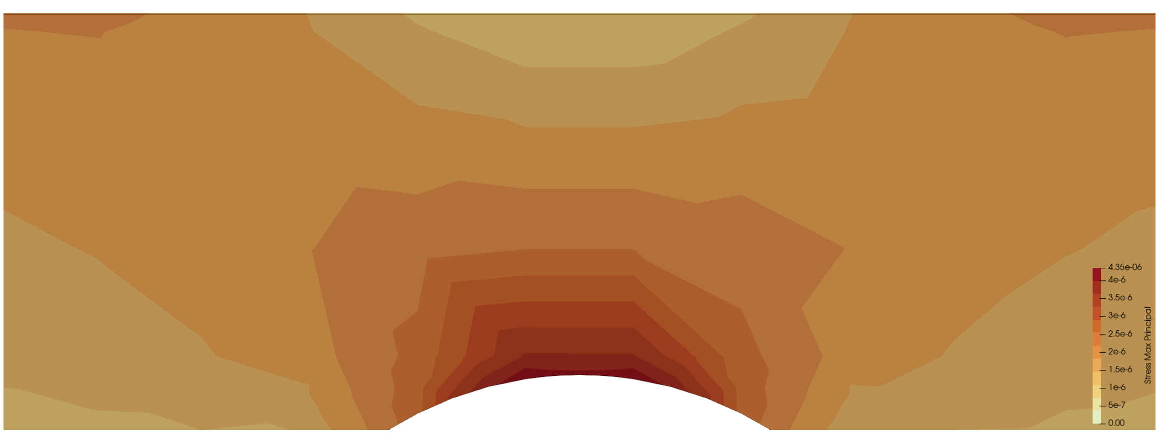
7.2.v h=0.375, p=1



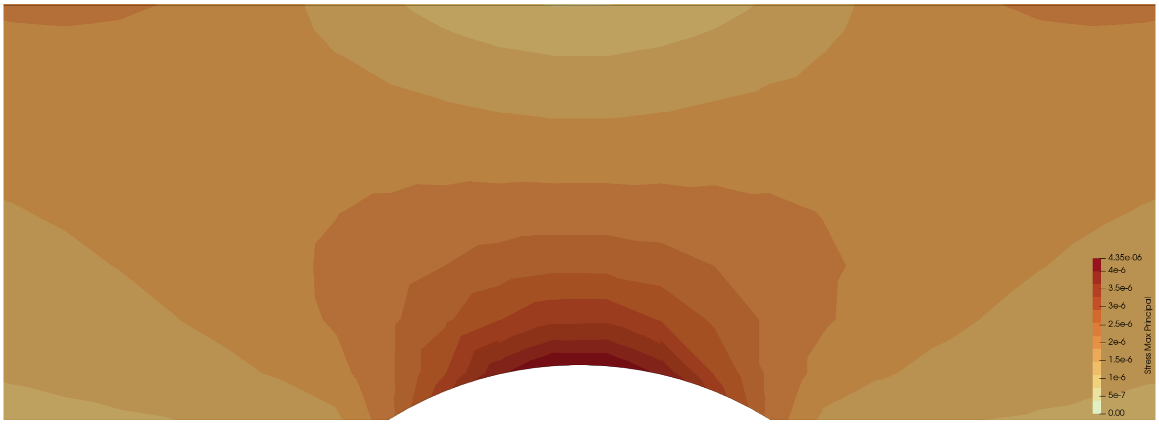
7.2.w h=6, p=2



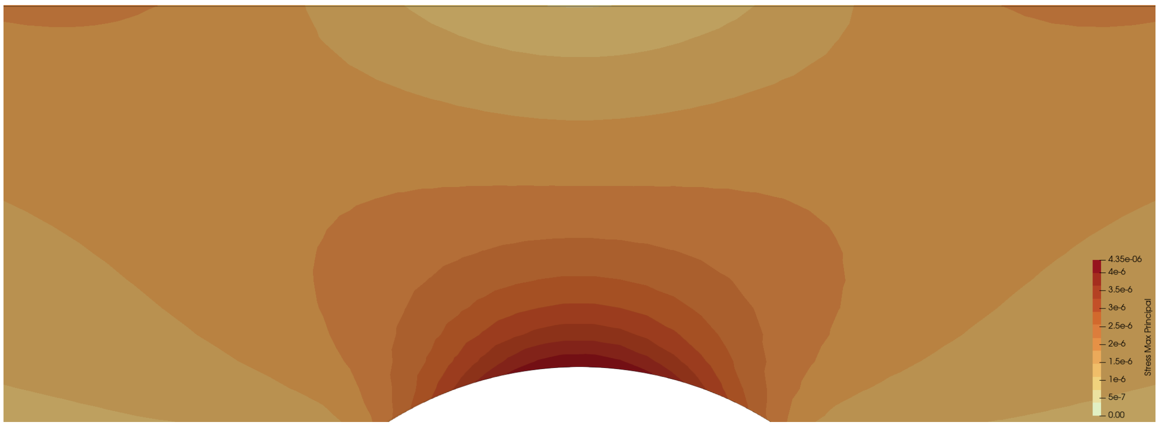
7.2.x h=3, p=2



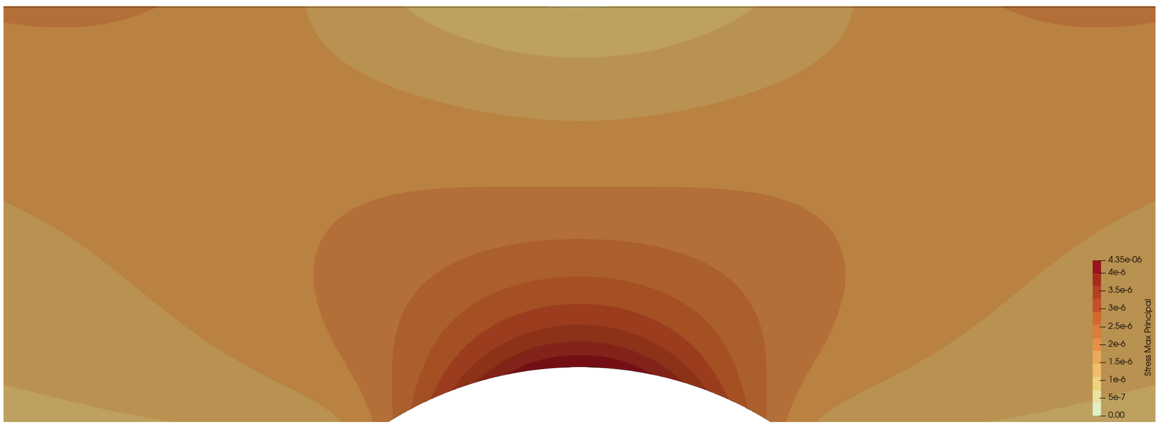
7.2.y h=1.5, p=2



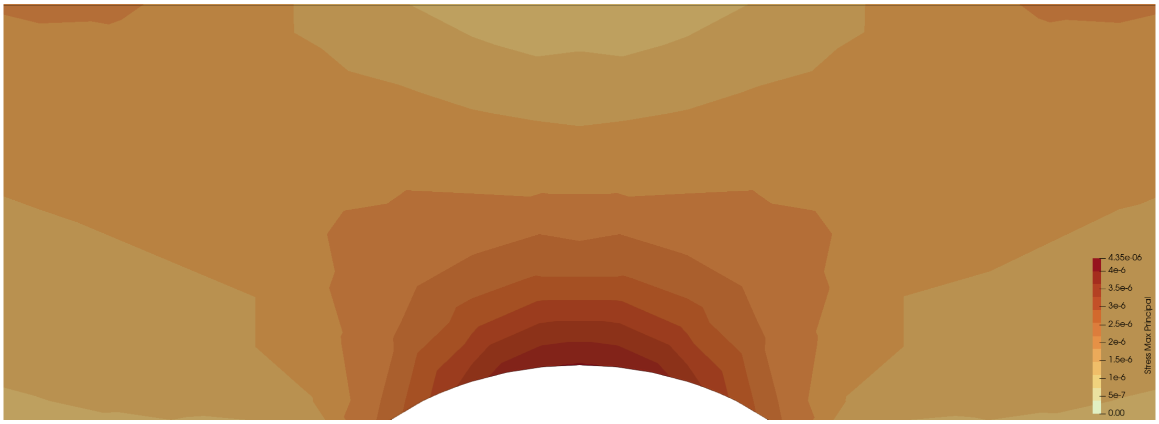
7.2.z h=0.75, p=2



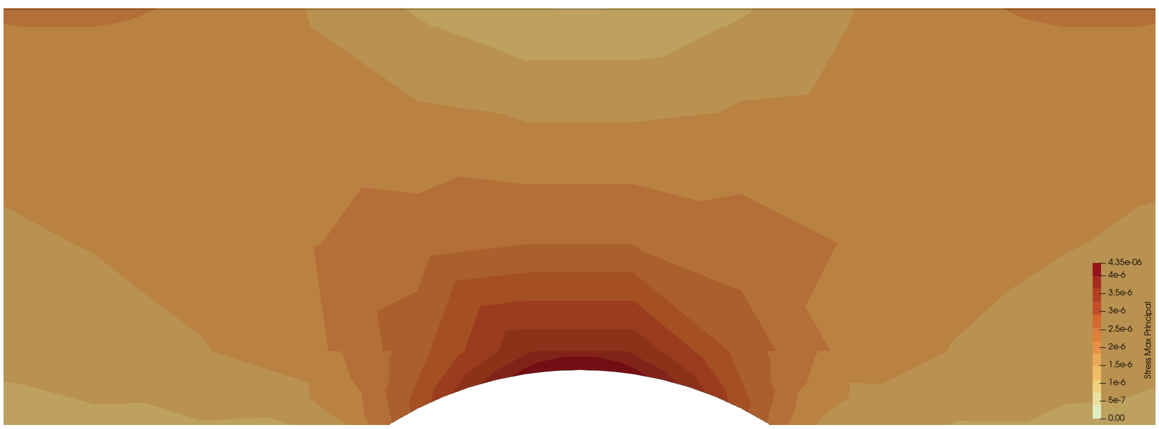
7.2.aa h=0.375, p=2



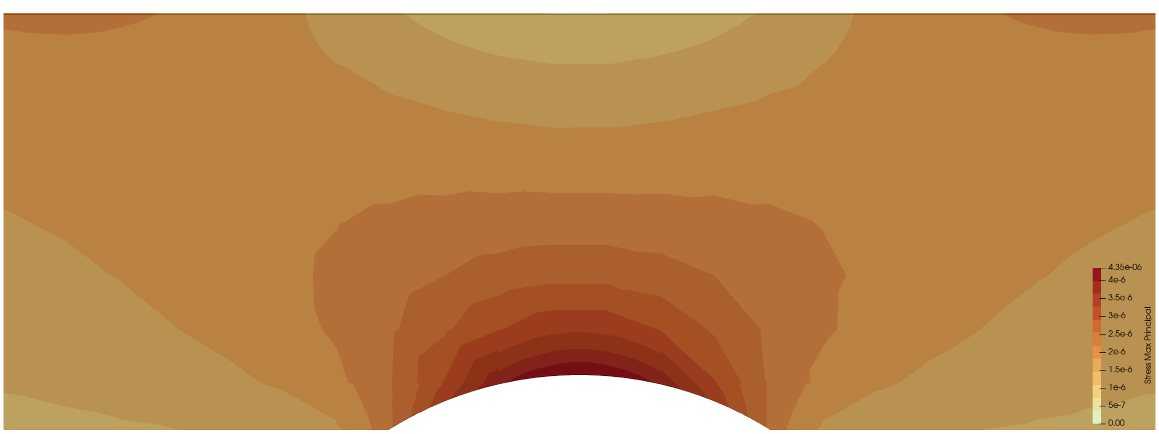
7.2.ab h=6, p=3



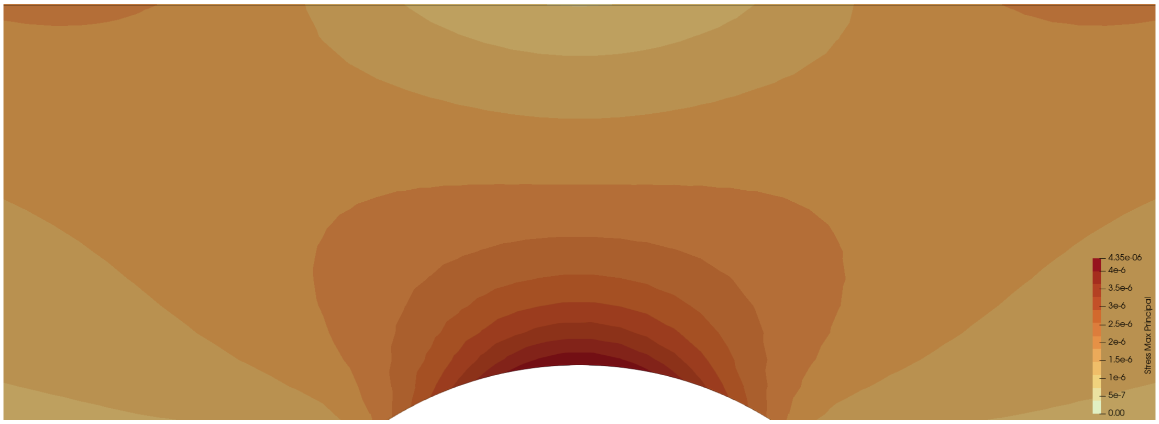
7.2.ac h=3, p=3



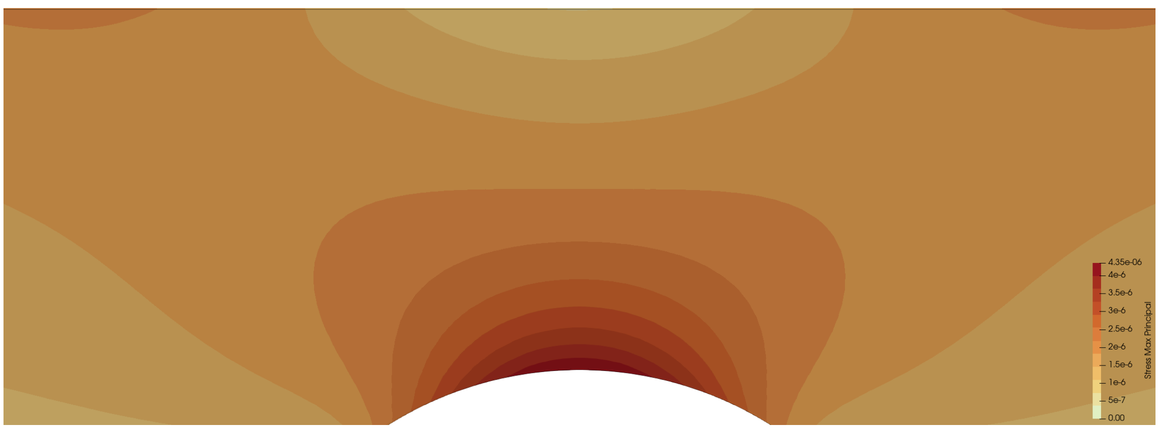
7.2.ad h=1.5, p=3



7.2.ae h=0.75, p=3

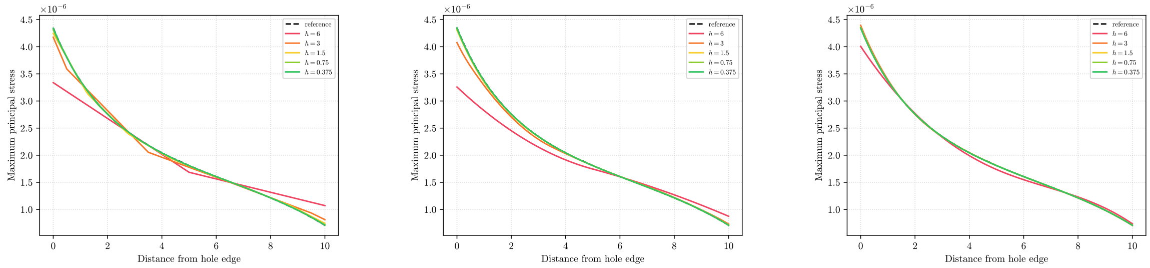


7.2.af h=0.375, p=3



7.3 Transverse stress profile

Figure 4 shows the transverse max-principal-stress profile along the line probe: the reference Abaqus solve against the coarse→fine IGA sweep, per degree. The IGA curves settle onto a consistent profile as h decreases.

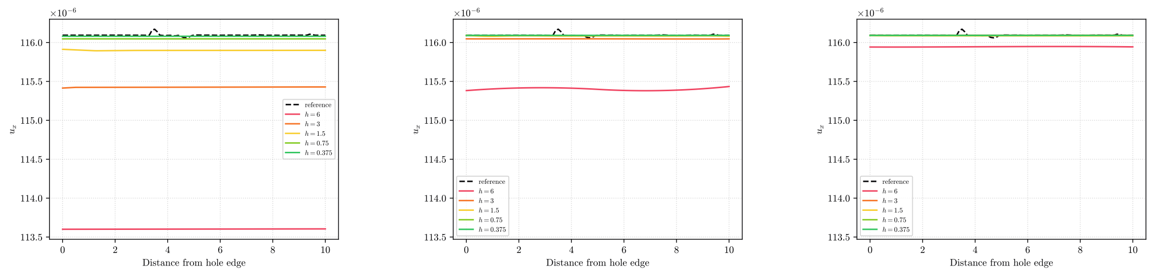


(a) $p = 1$ (b) $p = 2$ (c) $p = 3$

Figure 4: Transverse max-principal stress: reference vs the coarse→fine IGA sweep.

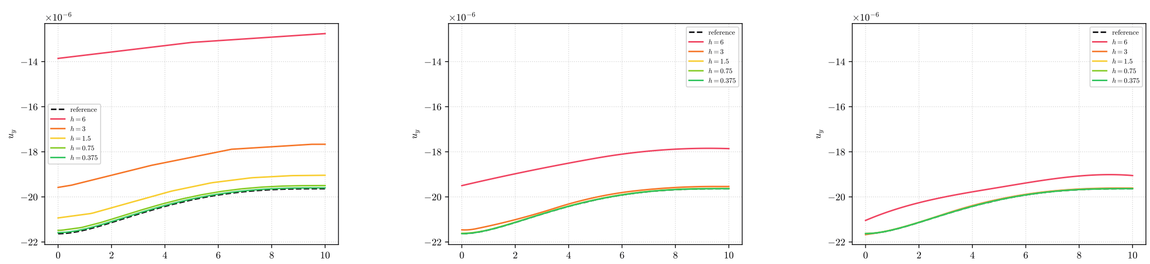
7.4 Displacement profiles

The transverse displacement components show the same h-refinement behavior — Figure 5 for u_x and Figure 6 for u_y.



(a) $p = 1$ (b) $p = 2$ (c) $p = 3$

Figure 5: Transverse u_x: reference vs the coarse→fine IGA sweep.



(a) $p = 1$ (b) $p = 2$ (c) $p = 3$

Figure 6: Transverse u_y: reference vs the coarse→fine IGA sweep.

7.5 Mesh convergence

Because the reference solve is itself an approximation — the IGA discretization may converge to a slightly different (and possibly more accurate) solution — we assess convergence against the finest IGA solution (self-convergence) rather than the reference. Figure 7 shows the transverse-stress L^2 error toward that finest solution, with fitted rates of 1.84 ($p = 1$), 2.25 ($p = 2$), and 2.38 ($p = 3$).

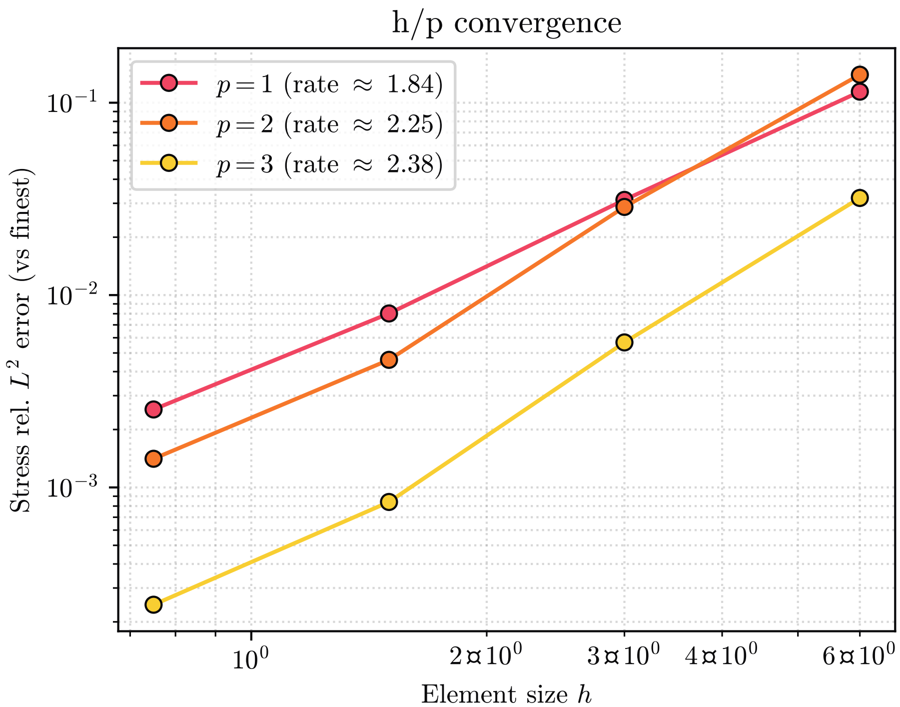


Figure 7: Self-convergence of the transverse-stress profile toward the finest IGA solution (not the reference solve), per degree.

8 Performance

Performance is reported separately for the two stages of an immersed IGA analysis: trimming (building the trimmed U-spline basis on the immersing grid) and the Abaqus solve. Abaqus problem size, timing, completion, and actual thread topology come from a sanitized JSON record generated from `abaqus summarize -detail advanced` and the solver message file. The raw summary files can contain host, user, and absolute-path data, so they are not published.

8.1 Coreform IGA Mesh

For each case the immersing background grid, the active Bezier elements kept in the analysis basis, and the cells actually cut by the part boundary are read from the trim database; the counts are nested subsets (background ⊇ active ⊇ trimmed), so they decrease left to right.

8.1.a $p = 1$

h	Total	Active	Trimmed	CPUs	Wall-time [s]
6	2,145	240	96	1	5.8
3	6,745	984	199	2	10.1

h	Total	Active	Trimmed	CPUs	Wall-time [s]
1.5	21,545	3,532	402	4	17.9
0.75	79,945	14,180	794	8	40.2
0.375	299,145	55,108	1,563	16	113.7

8.1.b $p = 2$

h	Total	Active	Trimmed	CPUs	Wall-time [s]
6	2,145	240	96	1	5.9
3	6,745	984	199	2	10.3
1.5	21,545	3,532	402	4	18.8
0.75	79,945	14,180	794	8	41.8
0.375	299,145	55,108	1,563	16	124.1

8.1.c $p = 3$

h	Total	Active	Trimmed	CPUs	Wall-time [s]
6	2,145	240	96	1	6.8
3	6,745	984	199	2	10.8
1.5	21,545	3,532	402	4	19.2
0.75	79,945	14,180	794	8	50.8
0.375	299,145	55,108	1,563	16	127.1

8.2 Coreform IGA for Abaqus solve

Problem size and solve-stage timing of the Abaqus job: the wall time is the Abaqus/Standard (solve) stage only — the pre and cleanup stages are excluded.

8.2.a $p = 1$

h	Elements	Nodes	DOFs	Threads	Wall-time [s]
6	324	652	1,956	1	1
3	1,156	2,292	6,876	2	2
1.5	3,856	7,700	23,100	4	2
0.75	14,832	29,628	88,884	8	4
0.375	56,392	112,708	338,124	16	18

8.2.b $p = 2$

h	Elements	Nodes	DOFs	Threads	Wall-time [s]
6	324	$1,084$	$3,252$	1	2
3	$1,156$	$3,640$	$10,920$	2	2
1.5	$3,856$	$11,976$	$35,928$	4	5
0.75	$14,832$	$45,284$	$135,852$	8	12
0.375	$56,392$	$170,768$	$512,304$	16	46

8.2.c $p = 3$

h	Elements	Nodes	DOFs	Threads	Wall-time [s]
6	380	$1,656$	$4,968$	1	5
3	$1,268$	$5,256$	$15,768$	2	10
1.5	$4,230$	$16,871$	$50,613$	4	19
0.75	$15,900$	$62,326$	$186,978$	8	69
0.375	$57,248$	$230,968$	$692,904$	16	177

8.3 Reference Abaqus solve

The body-fitted reference solve, for scale alongside the immersed cases.

h	Elements (C3D20)	Nodes	DOFs	Threads	Wall-time [s]
0.375	$202,452$	$1,020,224$	$3,060,672$	16	233

> **i Note**
>
> Trimming wall times come from `performance.json`, which the verification test writes around its trim step — runs from before that export show "—" until re-run. Trimming element counts are a function of h only, so they repeat across the degree tabs.

9 Discussion

At the finest mesh Coreform IGA recovers the accepted peak stress to 0.65% of Roark's K_t and the reference peak to 0.05%, while the transverse stress and displacement profiles match the reference to better than 10^{-3} in relative L^2. Under uniform refinement the stress profile self-converges at rates of 1.84 ($p = 1$), 2.25 ($p = 2$), and 2.38 ($p = 3$); the coarsest immersed meshes are pre-asymptotic, where raising the polynomial degree does not improve accuracy until the background mesh resolves the stress concentration.

Because the reference is itself an approximate FEM solution, convergence is assessed against the finest IGA solution rather than the reference. Agreement between Coreform IGA and the independent body-fitted reference to within a fraction of a percent — with both agreeing with Roark's analytic K_t — verifies the Coreform IGA immersed U-spline discretization for this stress-concentration problem.

References

[1] W. C. Young, R. G. Budynas, and A. M. Sadegh, *Roark's formulas for stress and strain*, 8th ed. New York: McGraw-Hill, 2011.

Appendix

9.1 Capabilities exercised

The table is generated from current passing simulation artifacts. Each row must satisfy the linked capability card's evidence contract; declaring a capability in a test does not, by itself, create evidence.

Table 6: Capabilities exercised by the current verification artifacts.

Capability	Evidence level	Official verification test
Linear static analysis	Numerically Validated	`Test_abaqus_verification_roark_17p1_7a_immersed_h2p2`
Threaded Abaqus/Standard execution	Numerically Validated	`Test_abaqus_verification_roark_17p1_7a_immersed_h2p2`
Parallel Coreform IGA mesh generation	Numerically Validated	`Test_abaqus_verification_roark_17p1_7a_immersed_h2p2`
Uniform pressure loading	Numerically Validated	`Test_abaqus_verification_roark_17p1_7a_immersed_h2p2`
Linear elastic material behavior	Numerically Validated	`Test_abaqus_verification_roark_17p1_7a_immersed_h2p2`
Linear C0 spline basis	Exercised	`Test_abaqus_verification_roark_17p1_7a_immersed_h2p1`
Quadratic C1 spline basis	Numerically Validated	`Test_abaqus_verification_roark_17p1_7a_immersed_h2p2`
Cubic C2 spline basis	Numerically Validated	`Test_abaqus_verification_roark_17p1_7a_immersed_h2p3`
Immersed rectilinear meshes	Numerically Validated	`Test_abaqus_verification_roark_17p1_7a_immersed_h2p2`
Explicit field-output selection	Numerically Validated	`Test_abaqus_verification_roark_17p1_7a_immersed_h2p2`
Stress field output (S)	Exercised	`Test_abaqus_verification_roark_17p1_7a_immersed_h2p2`
Displacement field output (U)	Numerically Validated	`Test_abaqus_verification_roark_17p1_7a_immersed_h2p2`
Line probes	Numerically Validated	`Test_abaqus_verification_roark_17p1_7a_immersed_h2p2`
Point probes	Numerically Validated	`Test_abaqus_verification_roark_17p1_7a_immersed_h2p2`
Dependent part instances	Numerically Validated	`Test_abaqus_verification_roark_17p1_7a_immersed_h2p2`

9.2 Download artifacts

Download artifacts are available from the HTML version of this page.

9.2.a Geometry CAD files

No separate CAD file is required for this problem; the geometry is fully defined in the Abaqus/CAE journal files.

9.2.b Abaqus/CAE journal files

Individual journal downloads are available from the HTML version of this page.

9.3 Supported Abaqus keywords

The deck below is reproduced from the verification tests' Abaqus input files with comments stripped and instance-specific names (sets, materials, files) redacted to `<placeholders>`.

i roark_17p1_7a.inp - Outline

```
*Heading
*Preprint, echo=NO, model=NO, history=NO, contact=NO
*Include, input=<iga-mesh-inp>
*System
*Material, name=<material>
*Elastic
1.,0.
*User Output Variables
1,
*Boundary
<node-set>, PINNED
*Step, name=<step>, nlgeom=NO
*Static
1., 1., 1e-05, 1.
*Restart, write, frequency=0
*Output, field
*Node Output
U,
*Element Output, position=AVERAGED AT NODES, directions=YES
S,
*Output, history, variable=PRESELECT
*End Step
```

9.4 Provenance

The records below identify the execution environment and verification basis for every CTest artifact reported on this page.

i Test_abaqus_verification_roark_17p1_7a_immersed_h0p1

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 4 record-only checks (0 positive)
Test date	27-Jul-2026 20:34:23
Operating system	Ubuntu Linux 24.04.2 LTS (Noble Numbat)
Coreform IGA version	`2026.7-dev+gvernon2_1785204663`
Source revision	`db258ffe9358`
Abaqus version	`2026_06_24-12.44.52 DEVr428 214170`

i Test_abaqus_verification_roark_17p1_7a_immersed_h0p2

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 4 record-only checks (1 positive)
Test date	27-Jul-2026 20:34:58
Operating system	Ubuntu Linux 24.04.2 LTS (Noble Numbat)
Coreform IGA version	`2026.7-dev+gvernon2_1785204663`
Source revision	`db258ffe9358`
Abaqus version	`2026_06_24-12.44.52 DEVr428 214170`

i Test_abaqus_verification_roark_17p1_7a_immersed_h0p3

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 4 record-only checks (1 positive)
Test date	27-Jul-2026 20:35:08
Operating system	Ubuntu Linux 24.04.2 LTS (Noble Numbat)
Coreform IGA version	`2026.7-dev+gvernon2_1785204663`
Source revision	`db258ffe9358`
Abaqus version	`2026_06_24-12.44.52 DEVr428 214170`

i Test_abaqus_verification_roark_17p1_7a_immersed_h1p1

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 4 record-only checks (2 positive)
Test date	27-Jul-2026 20:39:28
Operating system	Ubuntu Linux 24.04.2 LTS (Noble Numbat)
Coreform IGA version	`2026.7-dev+gvernon2_1785204663`
Source revision	`db258ffe9358`
Abaqus version	`2026_06_24-12.44.52 DEVr428 214170`

Test_abaqus_verification_roark_17p1_7a_immersed_h1p2

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 4 record-only checks (2 positive)
Test date	27-Jul-2026 20:39:35
Operating system	Ubuntu Linux 24.04.2 LTS (Noble Numbat)
Coreform IGA version	`2026.7-dev+gvernon2_1785204663`
Source revision	`db258ffe9358`
Abaqus version	`2026_06_24-12.44.52 DEVr428 214170`

Test_abaqus_verification_roark_17p1_7a_immersed_h1p3

Parameter	Value
Evidence type	Numerical verification
CTest result	Passed (Release)
Verification result	Passed — 4/4 enforced criteria passed
Test date	27-Jul-2026 20:40:11
Operating system	Ubuntu Linux 24.04.2 LTS (Noble Numbat)
Coreform IGA version	`2026.7-dev+gvernon2_1785204663`
Source revision	`db258ffe9358`
Abaqus version	`2026_06_24-12.44.52 DEVr428 214170`

Test_abaqus_verification_roark_17p1_7a_immersed_h2p1

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 4 record-only checks (3 positive)
Test date	27-Jul-2026 20:45:54
Operating system	Ubuntu Linux 24.04.2 LTS (Noble Numbat)
Coreform IGA version	`2026.7-dev+gvernon2_1785204663`
Source revision	`db258ffe9358`
Abaqus version	`2026_06_24-12.44.52 DEVr428 214170`

Test_abaqus_verification_roark_17p1_7a_immersed_h2p2

Parameter	Value
Evidence type	Numerical verification
CTest result	Passed (Release)
Verification result	Passed — 4/4 enforced criteria passed
Test date	27-Jul-2026 20:46:22
Operating system	Ubuntu Linux 24.04.2 LTS (Noble Numbat)
Coreform IGA version	`2026.7-dev+gvernon2_1785204663`
Source revision	`db258ffe9358`
Abaqus version	`2026_06_24-12.44.52 DEVr428 214170`

i Test_abaqus_verification_roark_17p1_7a_immersed_h2p3

Parameter	Value
Evidence type	Numerical verification
CTest result	Passed (Release)
Verification result	Passed — 4/4 enforced criteria passed
Test date	27-Jul-2026 20:47:10
Operating system	Ubuntu Linux 24.04.2 LTS (Noble Numbat)
Coreform IGA version	`2026.7-dev+gvernon2_1785204663`
Source revision	`db258ffe9358`
Abaqus version	`2026_06_24-12.44.52 DEVr428 214170`

i Test_abaqus_verification_roark_17p1_7a_immersed_h3p1

Parameter	Value
Evidence type	Numerical verification
CTest result	Passed (Release)
Verification result	Passed — 4/4 enforced criteria passed
Test date	27-Jul-2026 20:57:55
Operating system	Ubuntu Linux 24.04.2 LTS (Noble Numbat)
Coreform IGA version	`2026.7-dev+gvernon2_1785204663`
Source revision	`db258ffe9358`
Abaqus version	`2026_06_24-12.44.52 DEVr428 214170`

ℹ Test_abaqus_verification_roark_17p1_7a_immersed_h3p2

Parameter	Value
Evidence type	Numerical verification
CTest result	Passed (Release)
Verification result	Passed — 4/4 enforced criteria passed
Test date	27-Jul-2026 20:58:25
Operating system	Ubuntu Linux 24.04.2 LTS (Noble Numbat)
Coreform IGA version	`2026.7-dev+gvernon2_1785204663`
Source revision	`db258ffe9358`
Abaqus version	`2026_06_24-12.44.52 DEVr428 214170`

ℹ Test_abaqus_verification_roark_17p1_7a_immersed_h3p3

Parameter	Value
Evidence type	Numerical verification
CTest result	Passed (Release)
Verification result	Passed — 4/4 enforced criteria passed
Test date	27-Jul-2026 20:59:41
Operating system	Ubuntu Linux 24.04.2 LTS (Noble Numbat)
Coreform IGA version	`2026.7-dev+gvernon2_1785204663`
Source revision	`db258ffe9358`
Abaqus version	`2026_06_24-12.44.52 DEVr428 214170`

Test_abaqus_verification_roark_17p1_7a_immersed_h4p1

Parameter	Value
Evidence type	Numerical verification
CTest result	Passed (Release)
Verification result	Passed — 4/4 enforced criteria passed
Test date	27-Jul-2026 21:00:56
Operating system	Ubuntu Linux 24.04.2 LTS (Noble Numbat)
Coreform IGA version	`2026.7-dev+gvernon2_1785204663`
Source revision	`db258ffe9358`
Abaqus version	`2026_06_24-12.44.52 DEVr428 214170`

Test_abaqus_verification_roark_17p1_7a_immersed_h4p2

Parameter	Value
Evidence type	Numerical verification
CTest result	Passed (Release)
Verification result	Passed — 4/4 enforced criteria passed
Test date	27-Jul-2026 21:02:07
Operating system	Ubuntu Linux 24.04.2 LTS (Noble Numbat)
Coreform IGA version	`2026.7-dev+gvernon2_1785204663`
Source revision	`db258ffe9358`
Abaqus version	`2026_06_24-12.44.52 DEVr428 214170`

i Test_abaqus_verification_roark_17p1_7a_immersed_h4p3

Parameter	Value
Evidence type	Numerical verification
CTest result	Passed (Release)
Verification result	Passed — 4/4 enforced criteria passed
Test date	27-Jul-2026 21:05:25
Operating system	Ubuntu Linux 24.04.2 LTS (Noble Numbat)
Coreform IGA version	`2026.7-dev+gvernon2_1785204663`
Source revision	`db258ffe9358`
Abaqus version	`2026_06_24-12.44.52 DEVr428 214170`

i Test_abaqus_verification_roark_17p1_7a_reference

Parameter	Value
Evidence type	Numerical verification
CTest result	Passed (Release)
Verification result	Passed — 4/4 enforced criteria passed
Test date	27-Jul-2026 21:03:09
Operating system	Ubuntu Linux 24.04.2 LTS (Noble Numbat)
Coreform IGA version	`2026.7-dev+gvernon2_1785204663`
Source revision	`db258ffe9358`
Abaqus version	`2026_06_24-12.44.52 DEVr428 214170`