Multi-planar material interfaces

Table of contents

1 Objective

Verify that internal material-cell boundaries do not materially change the response of a homogeneous trimmed solid, including where multiple planar interface faces meet along longitudinal edges or at cross-section corners. Six partitioned square cross-sections are compared with an unpartitioned monolithic beam using identical elastic properties in every material definition. The quantities of interest are the relative differences in tip displacement and in displacement and stress profiles sampled along the beam and across its section.

2 Geometry

The specimen is a prismatic cantilever with square cross-section $b \times b$ and length L. Every internal cross-section boundary is extruded through the full beam length, producing planar material-interface faces parallel to the beam axis. Figure 1 shows the monolithic reference and the six partition patterns.

Figure 1: Normalized cross-sections used by the homogeneous material-interface study. Each color denotes a distinct retained cell and material definition; all material properties are identical.

Table 1: Geometric parameters.

Quantity	Symbol	Value
Cross-section width	b	10
Cross-section height	b	10
Beam length	L	100

The first three partitions exercise rectangular inclusions that respectively touch one exterior face, touch two exterior faces, or remain completely enclosed. The zig-zag and nested-L partitions divide the square into equal-area cells and introduce non-collinear interface planes. The Tetris partition uses a 3×3 construction: two equal four-square L cells surround a one-square central cell, so three materials meet at the central square's corners.

3 Material

The partitioned models use distinct Abaqus material and solid-section definitions for each colored cell: two definitions in the first five cases and three in the Tetris case. Every definition has the same isotropic, linear-elastic properties, so the internal boundaries are physically invisible in the continuum problem.

Table 2: Properties assigned independently to every material definition.

Property	Symbol	Value
Young's modulus	E	100×10^9
Poisson's ratio	ν	0.3

4 Loading & boundary conditions

The $z = 0$ end face is pinned in all three translational directions. A uniform surface traction of magnitude t_y acts in the negative y direction over every cell face at $z = L$. Applying the same traction to the full partitioned end face produces resultant shear force $P = t_y b^2$ and exercises bending and transverse shear without introducing density as another material parameter.

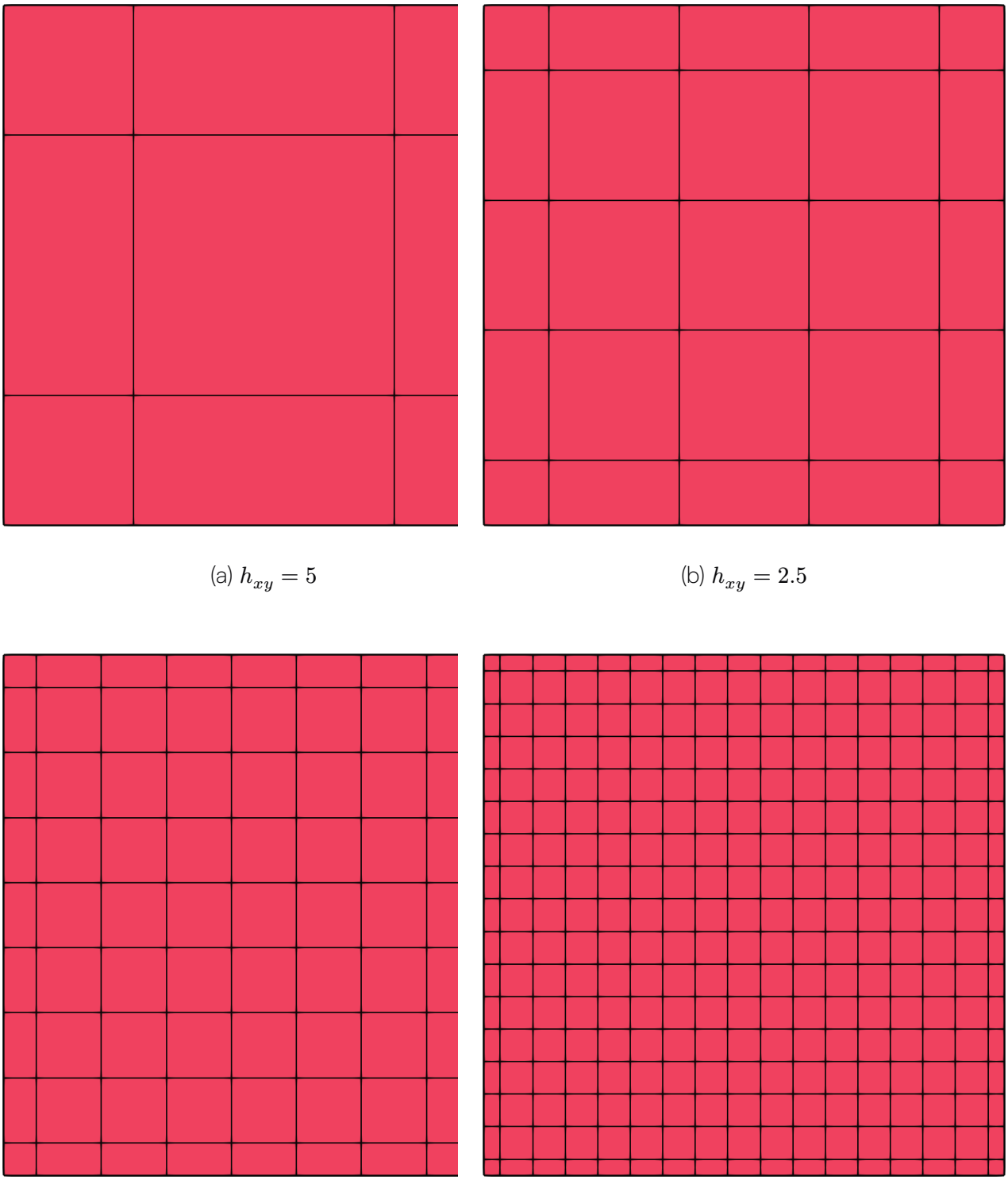
Table 3: Applied loading.

Quantity	Symbol	Value
End shear traction	t_y	10.0×10^{-3}
Resultant force	P	1
Direction	—	Negative y

5 Mesh & discretization

Each model uses the same immersed rectilinear background grid, outer geometry, grid origin, and h/p coordinates. The background element sizes are $(5, 5, 10)/2^k$ in (x, y, z) for $k = 0, ..., 3$, at degrees $p = 1$, 2, and 3 with maximum continuity C^{p-1}. Only the retained internal cell topology changes between the monolithic and partitioned models. The complete study contains 84 independently schedulable simulations: seven cross-sections, four refinement levels, and three degrees. The following views look along the beam axis and use the $p = 2$ results databases. Retained cells are colored categorically by `part_id` using the Coreform primary palette in index order; each 2-by-2 figure progresses from the coarsest to the finest cross-sectional background mesh.

5.1 Monolithic reference

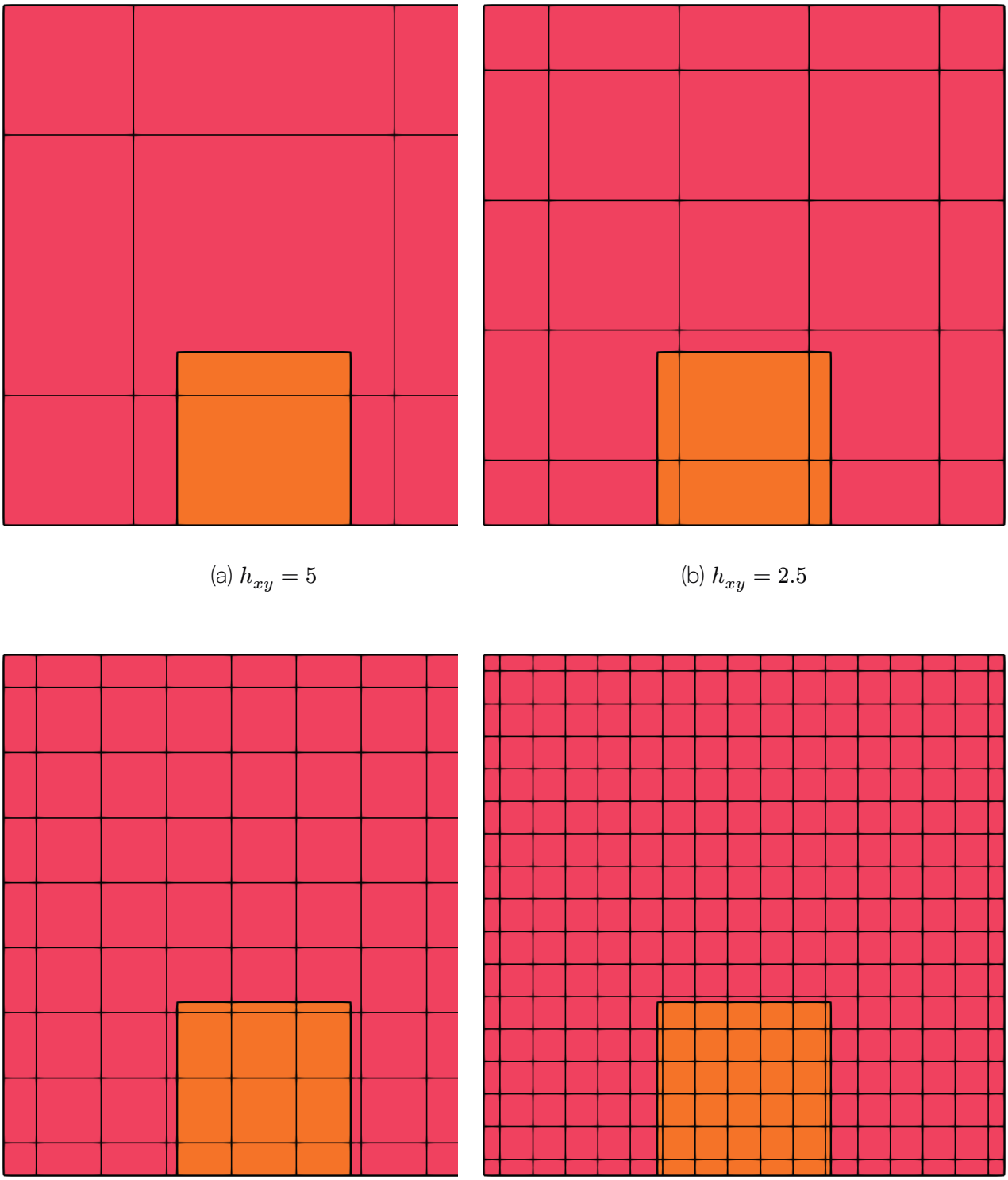


(a) $h_{xy} = 5$ (b) $h_{xy} = 2.5$

(c) $h_{xy} = 1.25$ (d) $h_{xy} = 0.625$

Figure 2: Monolithic reference cross-section meshes.

5.2 Bottom-centered one-third square

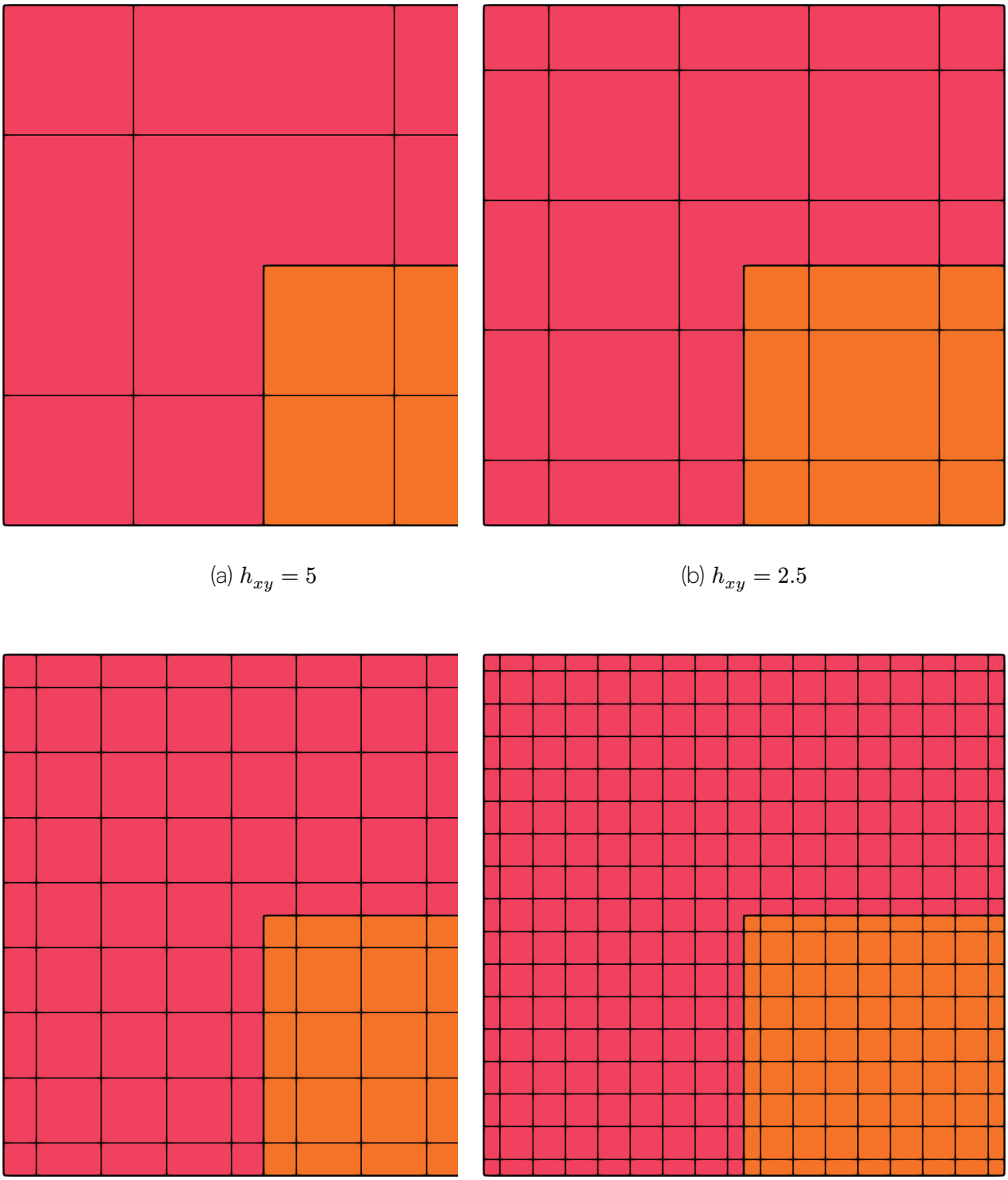


(a) $h_{xy} = 5$ (b) $h_{xy} = 2.5$

(c) $h_{xy} = 1.25$ (d) $h_{xy} = 0.625$

Figure 3: Bottom-centered one-third-square partition meshes.

5.3 Bottom-left one-half square

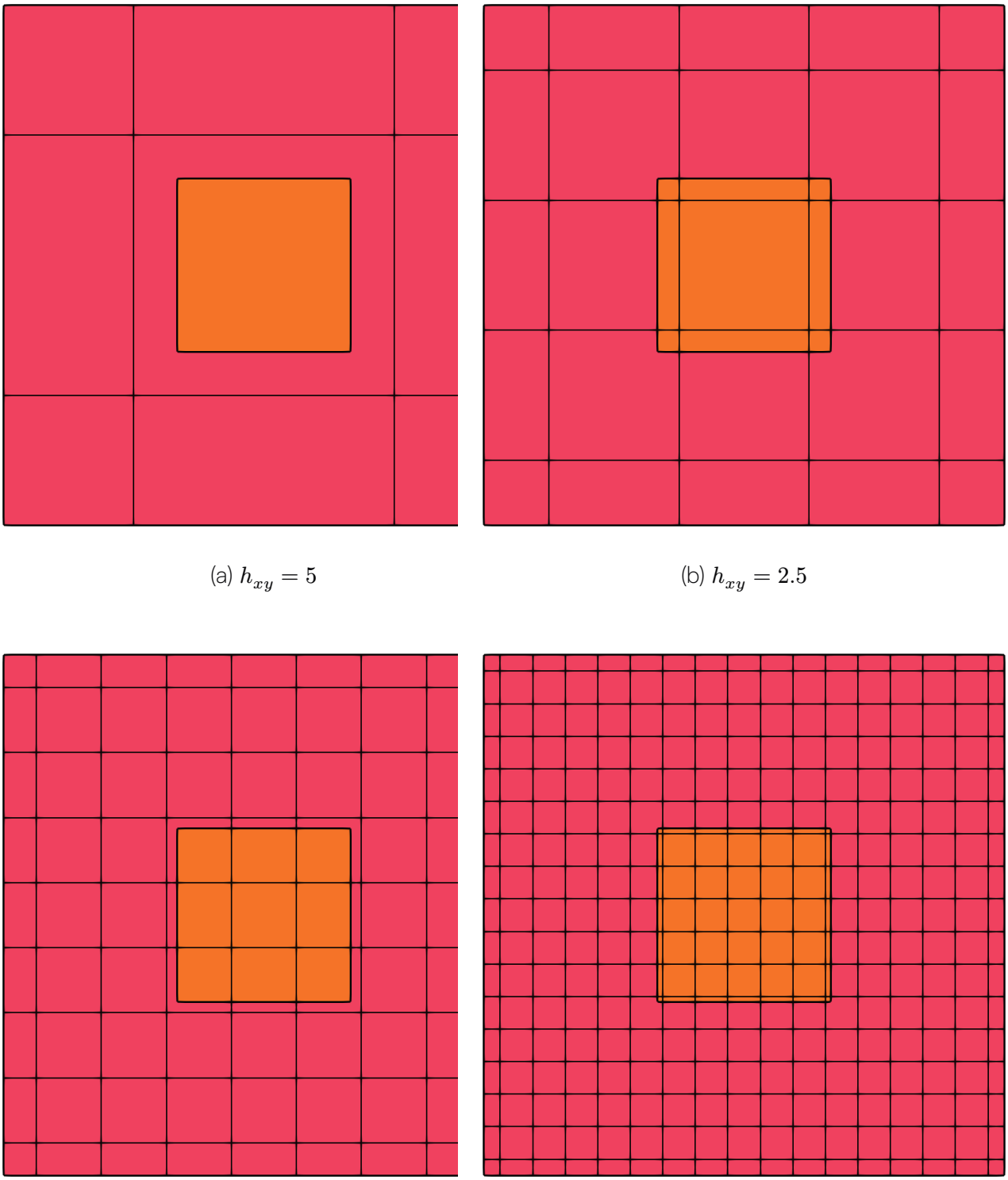


(a) $h_{xy} = 5$ (b) $h_{xy} = 2.5$

(c) $h_{xy} = 1.25$ (d) $h_{xy} = 0.625$

Figure 4: Bottom-left one-half-square partition meshes.

5.4 Centered one-third square

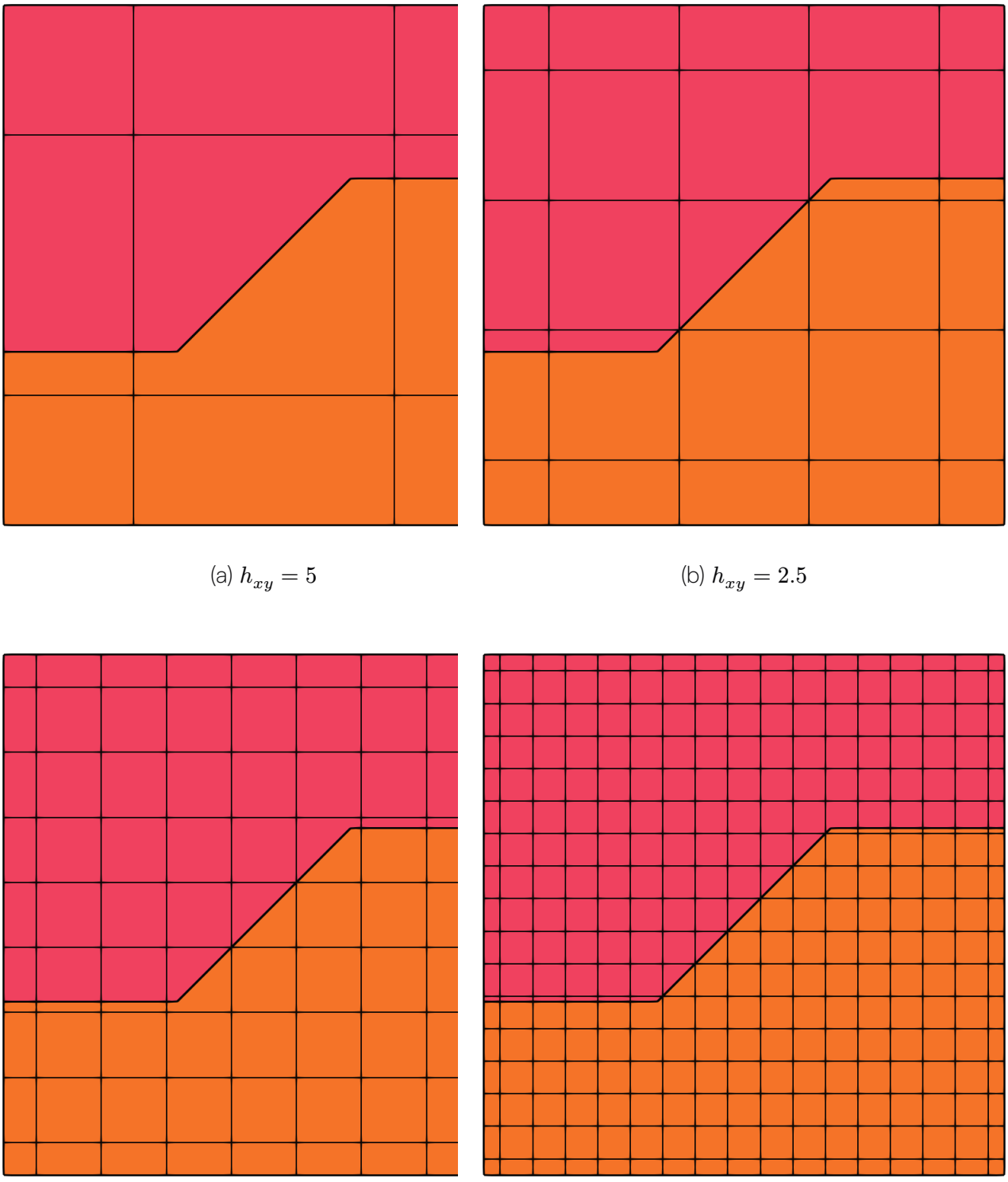


(a) $h_{xy} = 5$ (b) $h_{xy} = 2.5$

(c) $h_{xy} = 1.25$ (d) $h_{xy} = 0.625$

Figure 5: Centered one-third-square partition meshes.

5.5 Zig-zag interface

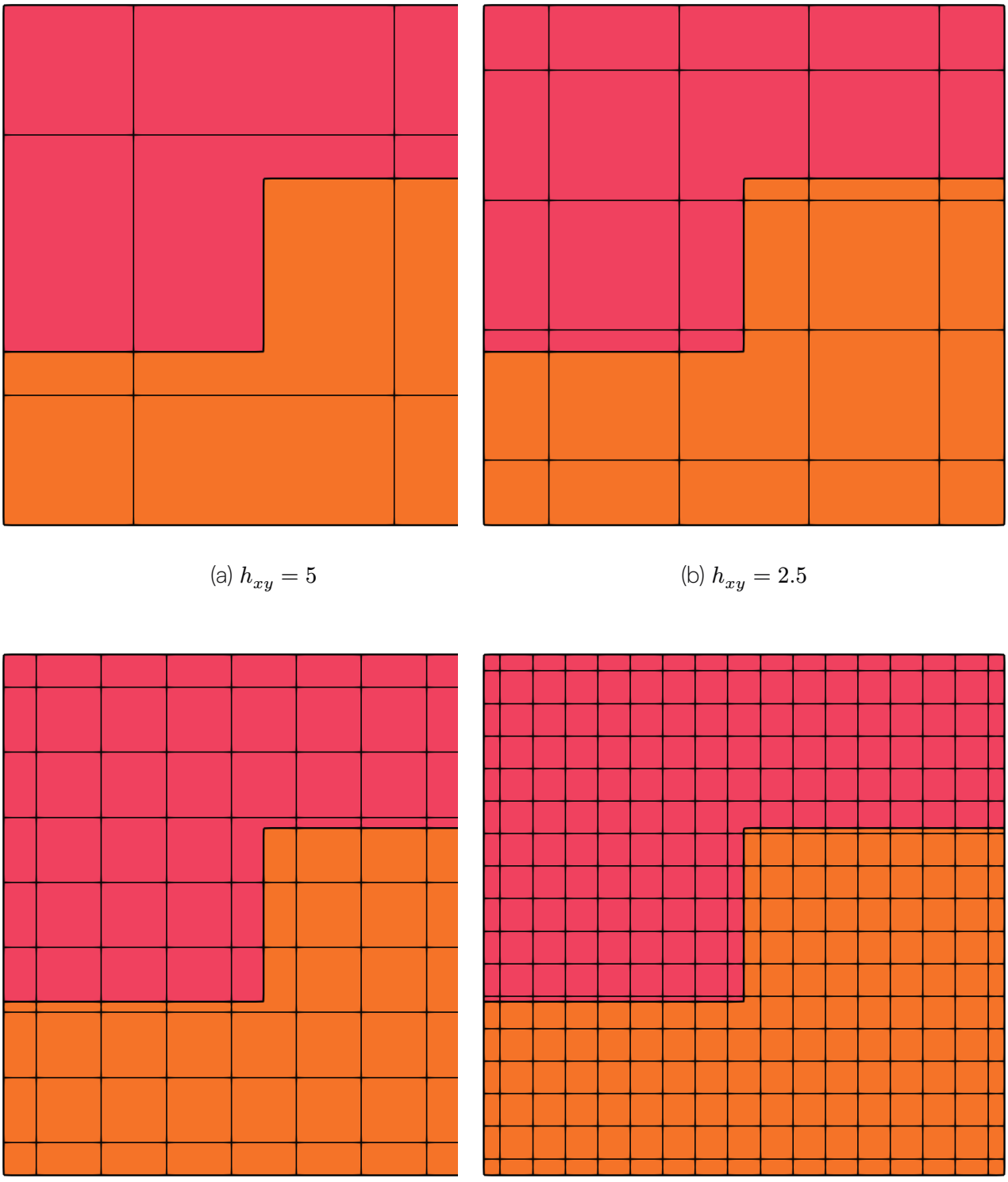


(a) $h_{xy} = 5$ (b) $h_{xy} = 2.5$

(c) $h_{xy} = 1.25$ (d) $h_{xy} = 0.625$

Figure 6: Zig-zag partition meshes.

5.6 Nested L interface

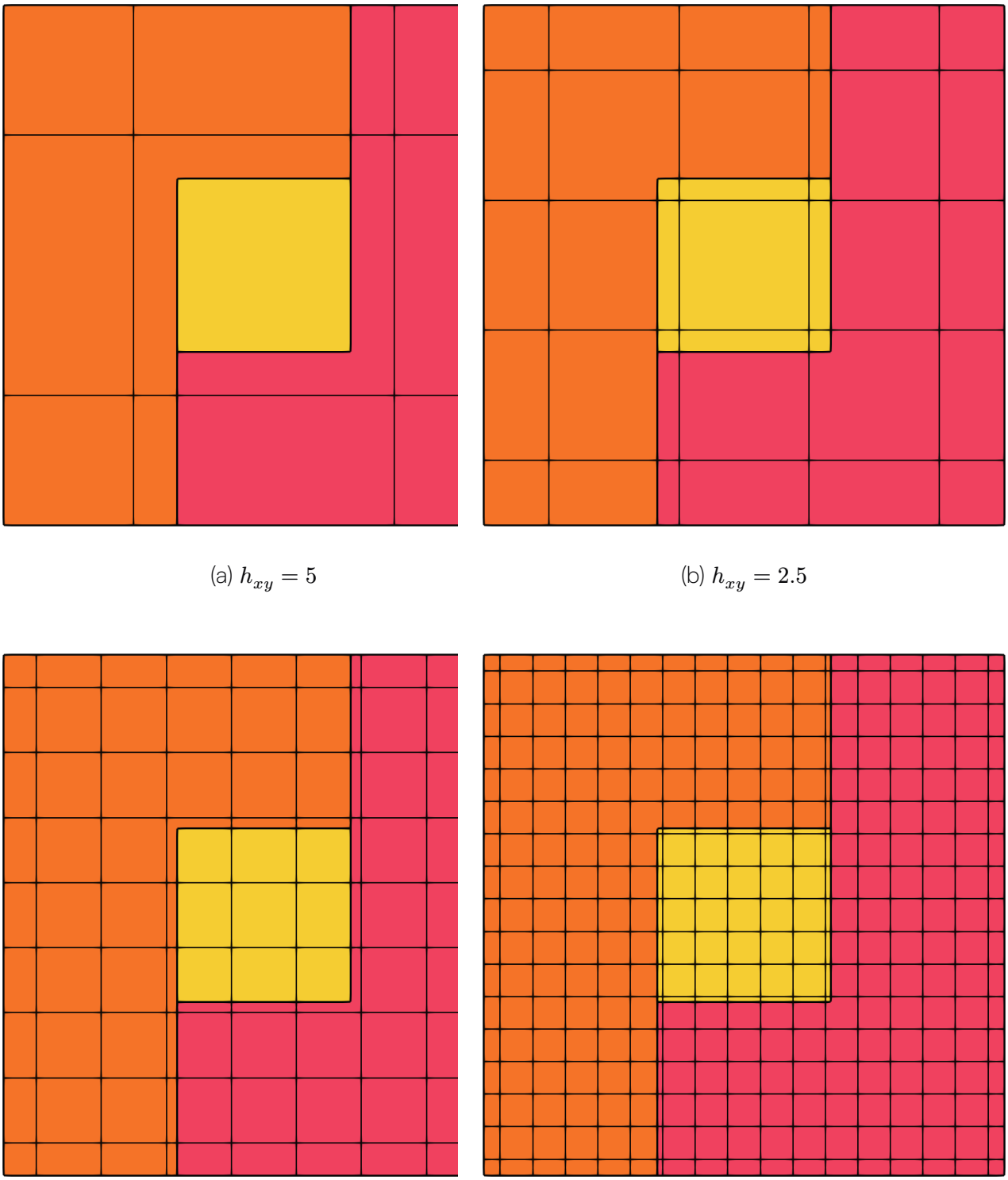


(a) $h_{xy} = 5$ (b) $h_{xy} = 2.5$

(c) $h_{xy} = 1.25$ (d) $h_{xy} = 0.625$

Figure 7: Nested-L partition meshes.

5.7 Tetris partition



(a) $h_{xy} = 5$ (b) $h_{xy} = 2.5$

(c) $h_{xy} = 1.25$ (d) $h_{xy} = 0.625$

Figure 8: Three-cell Tetris partition meshes.

6 Reference & accepted solutions

The primary numerical reference for every partitioned result is the monolithic beam at the identical degree, refinement level, background-grid placement, loading, and material properties. This same-h, same-p pairing removes ordinary discretization error from the comparison and isolates the effect of creating and coupling retained material cells.

Six response differences are recorded for every pairing: tip u_y; relative L^2 differences in u_y along an axial line; and relative L^2 differences in σ_{zz} and τ_{yz} along vertical and horizontal midspan probes. The study-level CTest takes the maximum of those six quantities at the finest level and enforces the calibrated acceptance tolerance. The homogeneous Euler—Bernoulli cantilever solution [1] is also recorded by each simulation as a secondary, record-only diagnostic; it is not used to judge interface invariance because it carries independent beam-theory modeling error.

7 Results

Each partition geometry below is presented independently. The case-tabbed table reports the measured partitioned response, the same-h, same-p monolithic reference response, and their relative difference for every mesh size and degree. For the tip displacement these are scalar values. For each line probe the measured and reference values are the profile L^2 norms, while the relative difference is the L^2 norm of the pointwise profile difference normalized by the reference norm. The three probe figures use one subfigure per degree and overlay every partitioned mesh size against the finest matching-degree monolithic result; the final figure tracks the maximum same-mesh relative difference across all six verification quantities under refinement.

7.1 Bottom-centered one-third square

7.1.a h=10, p=1

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-1.89×10^{-9}	-2.09×10^{-9}	9.44%
Centerline displacement $\|u_y\|_{L^2}$	9.28×10^{-9}	10.2×10^{-9}	9.26%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.25	0.279	10.4%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	31.8×10^{-3}	31.3×10^{-3}	11.9%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	48.4×10^{-3}	53.6×10^{-3}	9.76%

Quantity	Measured value	Reference value	Relative difference
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	38.9×10^{-3}	36.1×10^{-3}	8.09%

7.1.b h=5, p=1

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-3.32×10^{-9}	-3.41×10^{-9}	2.67%
Centerline displacement $\|u_y\|_{L^2}$	16.2×10^{-9}	16.6×10^{-9}	2.63%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.457	0.471	2.96%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	30.9×10^{-3}	30.6×10^{-3}	6.39%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	91.0×10^{-3}	94.4×10^{-3}	3.64%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	43.9×10^{-3}	43.9×10^{-3}	0.967%

7.1.c h=2.5, p=1

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-3.87×10^{-9}	-3.88×10^{-9}	0.238%
Centerline displacement $\|u_y\|_{L^2}$	18.8×10^{-9}	18.8×10^{-9}	0.236%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.531	0.533	0.46%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	31.8×10^{-3}	31.8×10^{-3}	1.08%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	0.108	0.108	0.292%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	46.6×10^{-3}	46.8×10^{-3}	0.375%

7.1.d h=1.25, p=1

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-3.97×10^{-9}	-3.97×10^{-9}	0.036%
Centerline displacement $\|u_y\|_{L^2}$	19.3×10^{-9}	19.3×10^{-9}	0.0361%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.544	0.544	0.219%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.1×10^{-3}	32.1×10^{-3}	0.936%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	90.1×10^{-3}	90.1×10^{-3}	0.0398%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	46.7×10^{-3}	46.7×10^{-3}	0.0783%

7.1.e h=10, p=2

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-3.99×10^{-9}	-3.99×10^{-9}	0.00453%
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	0.0079%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.162%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	26.5×10^{-3}	26.7×10^{-3}	2.69%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	95.6×10^{-3}	95.0×10^{-3}	0.83%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	37.5×10^{-3}	37.5×10^{-3}	0.291%

7.1.f h=5, p=2

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	0.00549%
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	0.00672%

Quantity	Measured value	Reference value	Relative difference
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.0237%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	30.8×10^{-3}	30.8×10^{-3}	2.64%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.7×10^{-3}	94.8×10^{-3}	0.0817%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	45.2×10^{-3}	45.2×10^{-3}	0.0854%

7.1.g h=2.5, p=2

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	$341 \times 10^{-6}\%$
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	$427 \times 10^{-6}\%$
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.00854%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	31.8×10^{-3}	31.8×10^{-3}	0.223%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.8×10^{-3}	94.8×10^{-3}	0.0278%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	46.9×10^{-3}	46.9×10^{-3}	0.133%

7.1.h h=1.25, p=2

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	$335 \times 10^{-6}\%$
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	$403 \times 10^{-6}\%$
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.00519%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.1×10^{-3}	32.1×10^{-3}	0.228%

Quantity	Measured value	Reference value	Relative difference
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.9×10^{-3}	94.9×10^{-3}	$395 \times 10^{-6}\%$
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	46.9×10^{-3}	46.9×10^{-3}	0.00364%

7.1.i h=10, p=3

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	0.00555%
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	0.00642%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.147%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.0×10^{-3}	32.0×10^{-3}	2.41%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.7×10^{-3}	94.9×10^{-3}	0.248%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	46.4×10^{-3}	47.0×10^{-3}	1.53%

7.1.j h=5, p=3

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	$85.8 \times 10^{-6}\%$
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	$121 \times 10^{-6}\%$
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.0153%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.2×10^{-3}	32.2×10^{-3}	0.0333%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.9×10^{-3}	94.9×10^{-3}	0.00664%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	47.0×10^{-3}	47.0×10^{-3}	0.147%

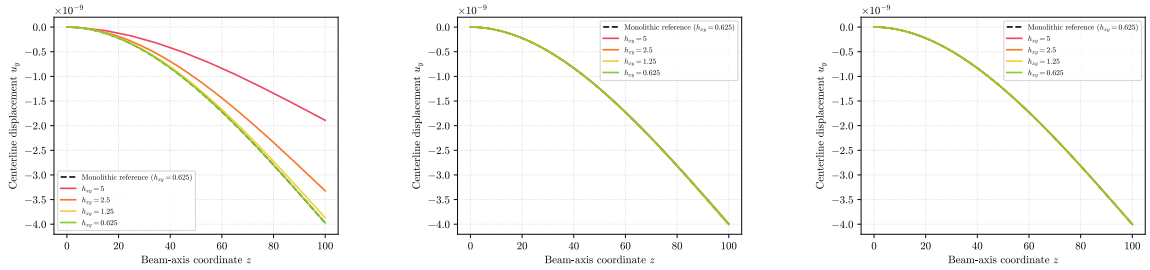
7.1.k h=2.5, p=3

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	$903 \times 10^{-6}\%$
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	0.00107%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.00818%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.2×10^{-3}	32.2×10^{-3}	0.146%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.9×10^{-3}	94.9×10^{-3}	0.0246%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	47.0×10^{-3}	47.1×10^{-3}	0.0148%

7.1.l h=1.25, p=3

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	$274 \times 10^{-6}\%$
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	$328 \times 10^{-6}\%$
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	$198 \times 10^{-6}\%$
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.2×10^{-3}	32.2×10^{-3}	0.0455%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.9×10^{-3}	94.9×10^{-3}	0.00405%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	47.1×10^{-3}	47.1×10^{-3}	0.00211%

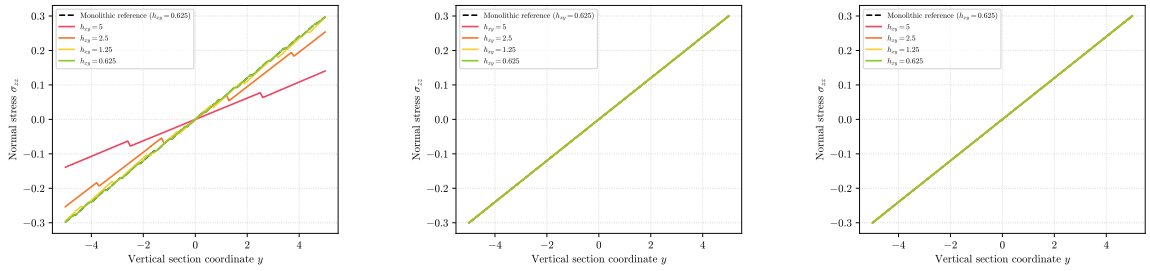
7.1.m Centerline displacement profile



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

Figure 9: Bottom-centered one-third square: centerline displacement profiles under mesh refinement.

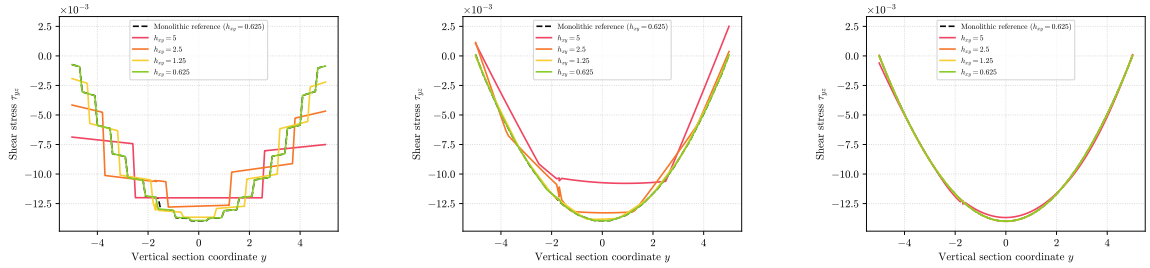
7.1.n Transverse normal-stress profile



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

Figure 10: Bottom-centered one-third square: transverse normal-stress profiles under mesh refinement.

7.1.o Transverse shear-stress profile



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

Figure 11: Bottom-centered one-third square: transverse shear-stress profiles under mesh refinement.

7.1.p Relative differences under refinement

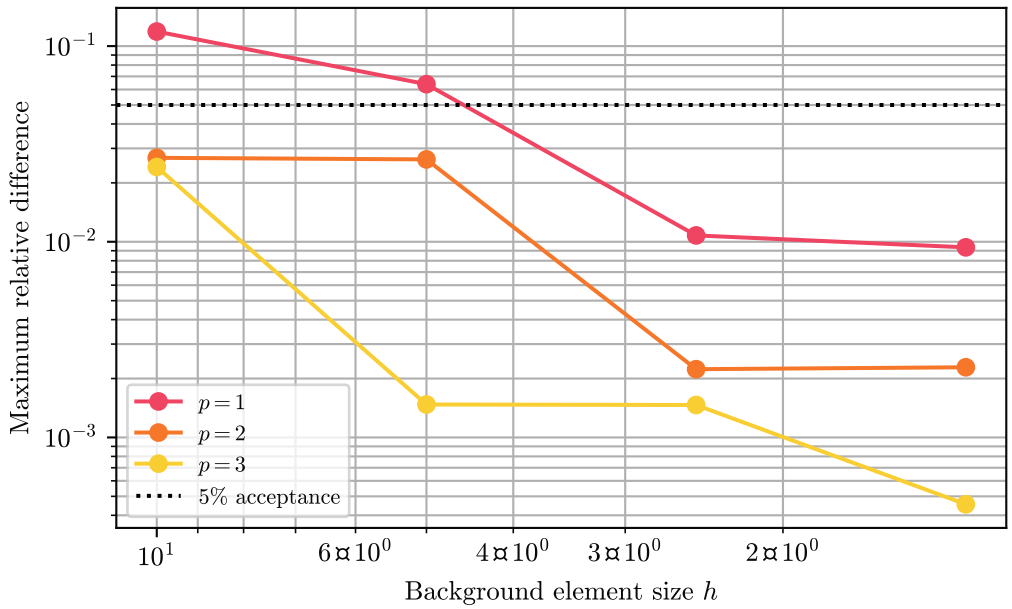


Figure 12: Bottom-centered one-third square: maximum homogeneous-response difference under refinement.

7.2 Bottom-left one-half square

7.2.a h=10, p=1

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-1.95×10^{-9}	-2.09×10^{-9}	6.52%
Centerline displacement $\|u_y\|_{L^2}$	9.59×10^{-9}	10.2×10^{-9}	6.26%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.256	0.279	8.35%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.0×10^{-3}	31.3×10^{-3}	7.75%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	45.4×10^{-3}	53.6×10^{-3}	18.6%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	37.9×10^{-3}	36.1×10^{-3}	5.92%

7.2.b h=5, p=1

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-3.34×10^{-9}	-3.41×10^{-9}	2.13%
Centerline displacement $\|u_y\|_{L^2}$	16.2×10^{-9}	16.6×10^{-9}	2.1%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.459	0.471	2.74%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	31.1×10^{-3}	30.6×10^{-3}	8.78%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	87.2×10^{-3}	94.4×10^{-3}	10.2%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	43.7×10^{-3}	43.9×10^{-3}	2.8%

7.2.c h=2.5, p=1

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-3.87×10^{-9}	-3.88×10^{-9}	0.186%
Centerline displacement $\|u_y\|_{L^2}$	18.8×10^{-9}	18.8×10^{-9}	0.184%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.531	0.533	0.429%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	31.8×10^{-3}	31.8×10^{-3}	0.828%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	0.104	0.108	6.01%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	46.7×10^{-3}	46.8×10^{-3}	0.698%

7.2.d h=1.25, p=1

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-3.97×10^{-9}	-3.97×10^{-9}	0.0198%
Centerline displacement $\|u_y\|_{L^2}$	19.3×10^{-9}	19.3×10^{-9}	0.0197%

Quantity	Measured value	Reference value	Relative difference
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.544	0.544	0.119%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.1×10^{-3}	32.1×10^{-3}	0.48%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	88.6×10^{-3}	90.1×10^{-3}	2.29%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	46.6×10^{-3}	46.7×10^{-3}	0.43%

7.2.e h=10, p=2

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-3.99×10^{-9}	-3.99×10^{-9}	0.0227%
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	0.0278%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.0297%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	26.6×10^{-3}	26.7×10^{-3}	4.83%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.5×10^{-3}	95.0×10^{-3}	0.793%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	38.2×10^{-3}	37.5×10^{-3}	5.28%

7.2.f h=5, p=2

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	0.00958%
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	0.0116%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.0357%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	30.8×10^{-3}	30.8×10^{-3}	2.17%

Quantity	Measured value	Reference value	Relative difference
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	95.0×10^{-3}	94.8×10^{-3}	0.306%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	45.3×10^{-3}	45.2×10^{-3}	0.663%

7.2.g h=2.5, p=2

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	$750 \times 10^{-6}\%$
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	$915 \times 10^{-6}\%$
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.0309%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	31.8×10^{-3}	31.8×10^{-3}	0.357%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.9×10^{-3}	94.8×10^{-3}	0.079%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	46.9×10^{-3}	46.9×10^{-3}	0.261%

7.2.h h=1.25, p=2

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	$177 \times 10^{-6}\%$
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	$210 \times 10^{-6}\%$
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.00386%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.1×10^{-3}	32.1×10^{-3}	0.149%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.9×10^{-3}	94.9×10^{-3}	0.00786%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	46.9×10^{-3}	46.9×10^{-3}	0.124%

7.2.i h=10, p=3

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	0.00183%
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	0.0021%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.201%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.0×10^{-3}	32.0×10^{-3}	0.802%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.6×10^{-3}	94.9×10^{-3}	0.602%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	46.6×10^{-3}	47.0×10^{-3}	1.35%

7.2.j h=5, p=3

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	0.00134%
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	0.00157%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.028%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.2×10^{-3}	32.2×10^{-3}	0.0406%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.9×10^{-3}	94.9×10^{-3}	0.135%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	47.0×10^{-3}	47.0×10^{-3}	0.0564%

7.2.k h=2.5, p=3

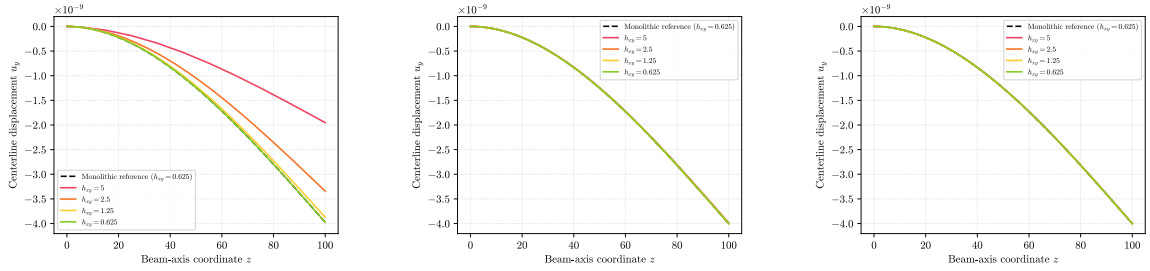
Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	$227 \times 10^{-6}\%$
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	$269 \times 10^{-6}\%$

Quantity	Measured value	Reference value	Relative difference
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.00916%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.2×10^{-3}	32.2×10^{-3}	0.114%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.9×10^{-3}	94.9×10^{-3}	0.0458%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	47.1×10^{-3}	47.1×10^{-3}	0.0515%

7.2.l h=1.25, p=3

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	$317 \times 10^{-6}\%$
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	$378 \times 10^{-6}\%$
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	$651 \times 10^{-6}\%$
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.2×10^{-3}	32.2×10^{-3}	0.0171%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.9×10^{-3}	94.9×10^{-3}	0.0092%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	47.1×10^{-3}	47.1×10^{-3}	0.00986%

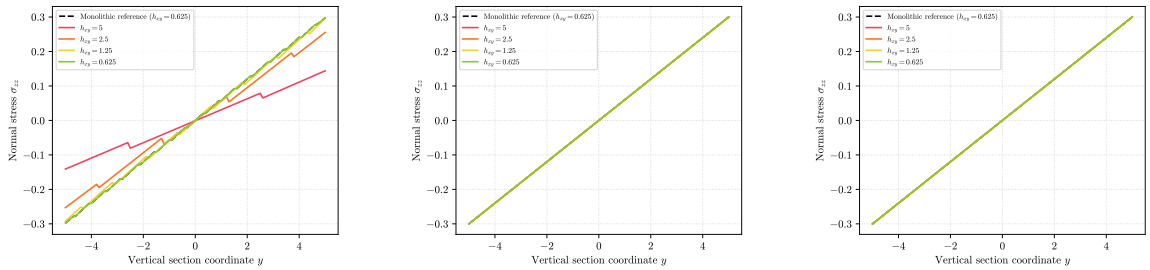
7.2.m Centerline displacement profile



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

Figure 13: Bottom-left one-half square: centerline displacement profiles under mesh refinement.

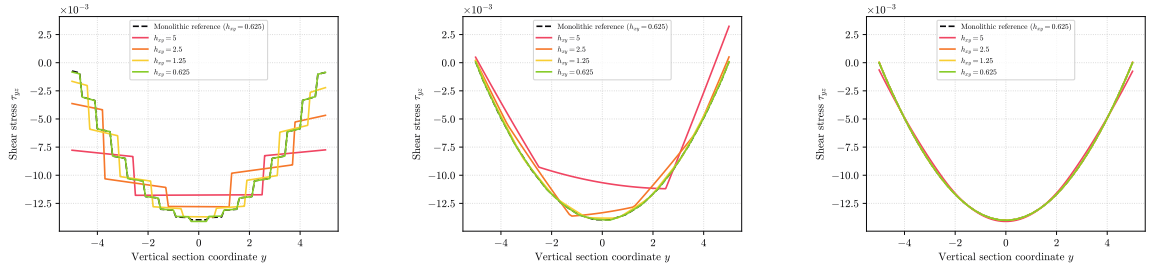
7.2.n Transverse normal-stress profile



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

Figure 14: Bottom-left one-half square: transverse normal-stress profiles under mesh refinement.

7.2.o Transverse shear-stress profile



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

Figure 15: Bottom-left one-half square: transverse shear-stress profiles under mesh refinement.

7.2.p Relative differences under refinement

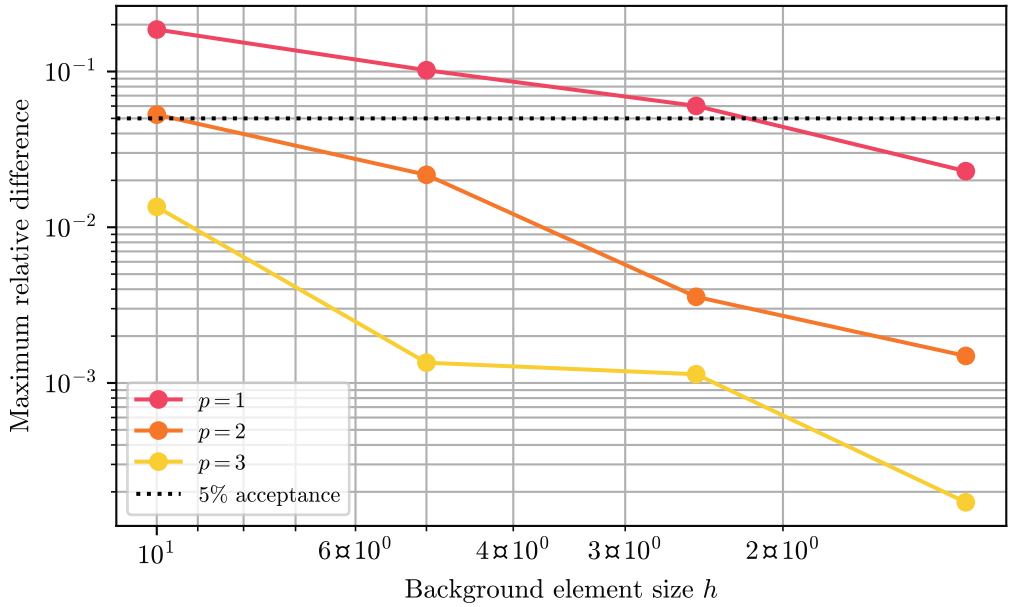


Figure 16: Bottom-left one-half square: maximum homogeneous-response difference under refinement.

7.3 Centered one-third square

7.3.a h=10, p=1

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-1.94×10^{-9}	-2.09×10^{-9}	7.1%
Centerline displacement $\|u_y\|_{L^2}$	9.54×10^{-9}	10.2×10^{-9}	6.79%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.253	0.279	9.47%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	31.9×10^{-3}	31.3×10^{-3}	9.98%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	48.6×10^{-3}	53.6×10^{-3}	9.46%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	38.7×10^{-3}	36.1×10^{-3}	7.61%

7.3.b h=5, p=1

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-3.17×10^{-9}	-3.41×10^{-9}	7.06%
Centerline displacement $\|u_y\|_{L^2}$	15.4×10^{-9}	16.6×10^{-9}	6.99%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.434	0.471	7.85%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	31.0×10^{-3}	30.6×10^{-3}	3.11%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	87.2×10^{-3}	94.4×10^{-3}	7.72%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	44.1×10^{-3}	43.9×10^{-3}	1.8%

7.3.c h=2.5, p=1

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-3.87×10^{-9}	-3.88×10^{-9}	0.293%
Centerline displacement $\|u_y\|_{L^2}$	18.8×10^{-9}	18.8×10^{-9}	0.291%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.531	0.533	0.424%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	31.8×10^{-3}	31.8×10^{-3}	1.59%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	0.108	0.108	0.561%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	46.8×10^{-3}	46.8×10^{-3}	0.401%

7.3.d h=1.25, p=1

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-3.97×10^{-9}	-3.97×10^{-9}	0.0566%
Centerline displacement $\|u_y\|_{L^2}$	19.3×10^{-9}	19.3×10^{-9}	0.0567%

Quantity	Measured value	Reference value	Relative difference
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.544	0.544	0.306%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.1×10^{-3}	32.1×10^{-3}	1.13%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	90.1×10^{-3}	90.1×10^{-3}	0.161%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	46.7×10^{-3}	46.7×10^{-3}	0.101%

7.3.e h=10, p=2

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-3.99×10^{-9}	-3.99×10^{-9}	0.00316%
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	0.00114%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.114%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	26.7×10^{-3}	26.7×10^{-3}	2.16%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	95.4×10^{-3}	95.0×10^{-3}	0.631%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	37.5×10^{-3}	37.5×10^{-3}	0.514%

7.3.f h=5, p=2

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	0.00213%
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	0.00275%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.0171%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	30.8×10^{-3}	30.8×10^{-3}	0.782%

Quantity	Measured value	Reference value	Relative difference
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	95.1×10^{-3}	94.8×10^{-3}	0.422%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	45.2×10^{-3}	45.2×10^{-3}	0.792%

7.3.g h=2.5, p=2

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	$126 \times 10^{-6}\%$
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	$144 \times 10^{-6}\%$
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.016%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	31.8×10^{-3}	31.8×10^{-3}	0.364%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.8×10^{-3}	94.8×10^{-3}	0.0359%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	46.9×10^{-3}	46.9×10^{-3}	0.281%

7.3.h h=1.25, p=2

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	$87.5 \times 10^{-6}\%$
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	$107 \times 10^{-6}\%$
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.00561%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.1×10^{-3}	32.1×10^{-3}	0.329%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.9×10^{-3}	94.9×10^{-3}	0.0216%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	46.9×10^{-3}	46.9×10^{-3}	0.0618%

7.3.i h=10, p=3

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	0.00122%
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	$388 \times 10^{-6}\%$
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.126%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.1×10^{-3}	32.0×10^{-3}	1.24%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.8×10^{-3}	94.9×10^{-3}	0.221%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	46.9×10^{-3}	47.0×10^{-3}	0.607%

7.3.j h=5, p=3

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	$554 \times 10^{-6}\%$
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	$647 \times 10^{-6}\%$
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.0285%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.2×10^{-3}	32.2×10^{-3}	0.112%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	95.0×10^{-3}	94.9×10^{-3}	0.175%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	47.0×10^{-3}	47.0×10^{-3}	0.183%

7.3.k h=2.5, p=3

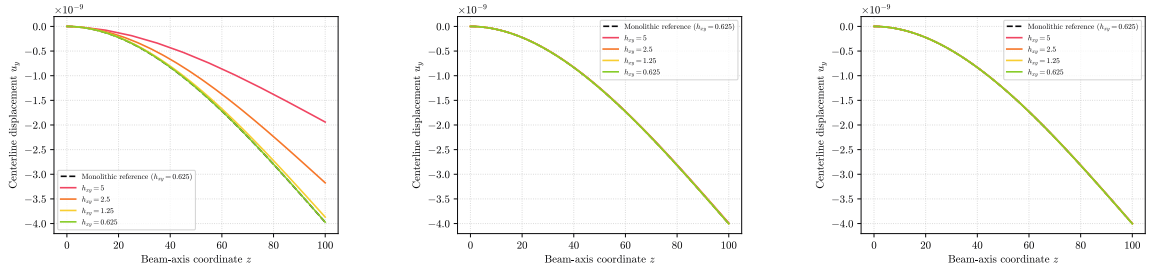
Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	$120 \times 10^{-6}\%$
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	$134 \times 10^{-6}\%$

Quantity	Measured value	Reference value	Relative difference
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.0157%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.2×10^{-3}	32.2×10^{-3}	0.226%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.9×10^{-3}	94.9×10^{-3}	0.0879%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	47.0×10^{-3}	47.1×10^{-3}	0.0327%

7.3.l h=1.25, p=3

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	$83.5 \times 10^{-6}\%$
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	$101 \times 10^{-6}\%$
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.00336%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.2×10^{-3}	32.2×10^{-3}	0.0211%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.9×10^{-3}	94.9×10^{-3}	0.00912%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	47.1×10^{-3}	47.1×10^{-3}	0.0118%

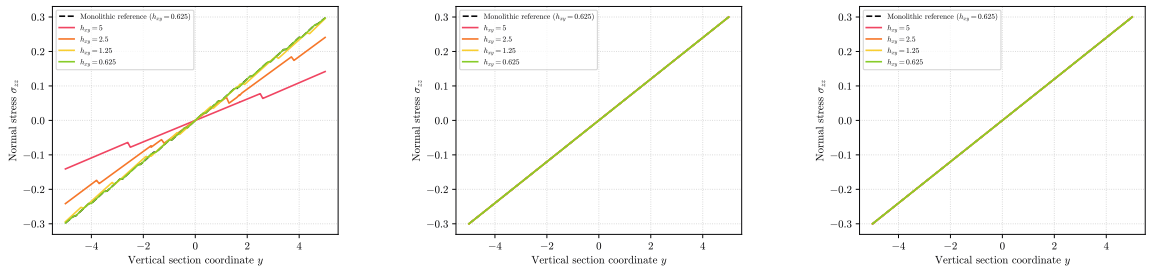
7.3.m Centerline displacement profile



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

Figure 17: Centered one-third square: centerline displacement profiles under mesh refinement.

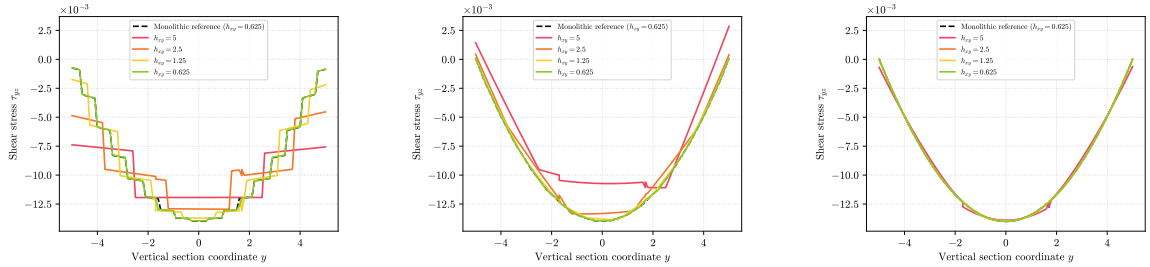
7.3.n Transverse normal-stress profile



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

Figure 18: Centered one-third square: transverse normal-stress profiles under mesh refinement.

7.3.o Transverse shear-stress profile



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

Figure 19: Centered one-third square: transverse shear-stress profiles under mesh refinement.

7.3.p Relative differences under refinement

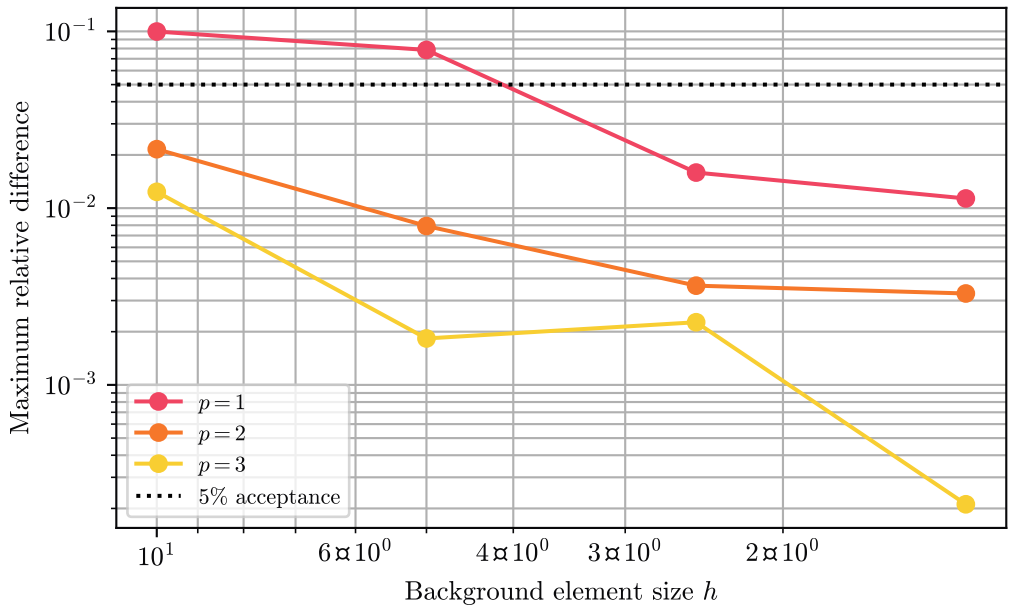


Figure 20: Centered one-third square: maximum homogeneous-response difference under refinement.

7.4 Zig-zag interface

7.4.a h=10, p=1

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-1.99×10^{-9}	-2.09×10^{-9}	4.56%
Centerline displacement $\|u_y\|_{L^2}$	9.79×10^{-9}	10.2×10^{-9}	4.33%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.264	0.279	5.48%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	31.6×10^{-3}	31.3×10^{-3}	4.29%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	50.7×10^{-3}	53.6×10^{-3}	6.81%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	37.2×10^{-3}	36.1×10^{-3}	3.22%

7.4.b h=5, p=1

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-3.34×10^{-9}	-3.41×10^{-9}	2.18%
Centerline displacement $\|u_y\|_{L^2}$	16.2×10^{-9}	16.6×10^{-9}	2.14%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.459	0.471	2.75%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	30.9×10^{-3}	30.6×10^{-3}	6.14%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	92.8×10^{-3}	94.4×10^{-3}	3.48%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	44.6×10^{-3}	43.9×10^{-3}	4.02%

7.4.c h=2.5, p=1

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-3.87×10^{-9}	-3.88×10^{-9}	0.192%
Centerline displacement $\|u_y\|_{L^2}$	18.8×10^{-9}	18.8×10^{-9}	0.19%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.532	0.533	0.295%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	31.8×10^{-3}	31.8×10^{-3}	1.13%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	0.107	0.108	2.02%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	46.6×10^{-3}	46.8×10^{-3}	0.627%

7.4.d h=1.25, p=1

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-3.97×10^{-9}	-3.97×10^{-9}	0.0271%
Centerline displacement $\|u_y\|_{L^2}$	19.3×10^{-9}	19.3×10^{-9}	0.0269%

Quantity	Measured value	Reference value	Relative difference
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.544	0.544	0.133%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.1×10^{-3}	32.1×10^{-3}	1.16%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	90.1×10^{-3}	90.1×10^{-3}	0.838%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	46.6×10^{-3}	46.7×10^{-3}	0.499%

7.4.e h=10, p=2

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-3.99×10^{-9}	-3.99×10^{-9}	0.0283%
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	0.0335%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.0635%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	26.2×10^{-3}	26.7×10^{-3}	7.17%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	95.3×10^{-3}	95.0×10^{-3}	1.14%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	37.3×10^{-3}	37.5×10^{-3}	2.15%

7.4.f h=5, p=2

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	0.00223%
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	0.00296%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.00625%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	30.8×10^{-3}	30.8×10^{-3}	1.22%

Quantity	Measured value	Reference value	Relative difference
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	95.0×10^{-3}	94.8×10^{-3}	0.294%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	45.0×10^{-3}	45.2×10^{-3}	0.807%

7.4.g h=2.5, p=2

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	$645 \times 10^{-6}\%$
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	$751 \times 10^{-6}\%$
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.0114%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	31.8×10^{-3}	31.8×10^{-3}	0.139%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.9×10^{-3}	94.8×10^{-3}	0.0528%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	46.8×10^{-3}	46.9×10^{-3}	0.561%

7.4.h h=1.25, p=2

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	$456 \times 10^{-6}\%$
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	$543 \times 10^{-6}\%$
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.00128%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.1×10^{-3}	32.1×10^{-3}	0.142%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.9×10^{-3}	94.9×10^{-3}	0.044%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	46.9×10^{-3}	46.9×10^{-3}	0.0546%

7.4.i h=10, p=3

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	0.00742%
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	0.00885%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.0519%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.1×10^{-3}	32.0×10^{-3}	1.15%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	95.0×10^{-3}	94.9×10^{-3}	0.254%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	47.2×10^{-3}	47.0×10^{-3}	1.44%

7.4.j h=5, p=3

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	0.00261%
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	0.00306%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.0168%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.2×10^{-3}	32.2×10^{-3}	0.415%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.8×10^{-3}	94.9×10^{-3}	0.147%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	47.0×10^{-3}	47.0×10^{-3}	0.459%

7.4.k h=2.5, p=3

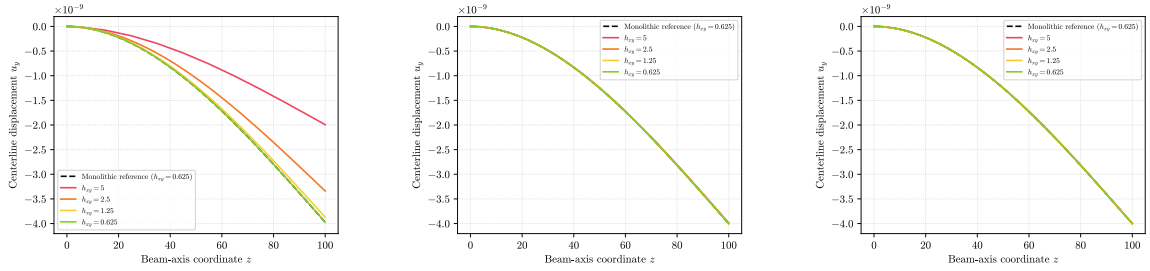
Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	$422 \times 10^{-6}\%$
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	$506 \times 10^{-6}\%$

Quantity	Measured value	Reference value	Relative difference
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.0063%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.2×10^{-3}	32.2×10^{-3}	0.193%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.9×10^{-3}	94.9×10^{-3}	0.058%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	47.0×10^{-3}	47.1×10^{-3}	0.269%

7.4.l h=1.25, p=3

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	$217 \times 10^{-6}\%$
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	$256 \times 10^{-6}\%$
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	$620 \times 10^{-6}\%$
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.2×10^{-3}	32.2×10^{-3}	0.46%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.9×10^{-3}	94.9×10^{-3}	0.00508%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	47.1×10^{-3}	47.1×10^{-3}	0.265%

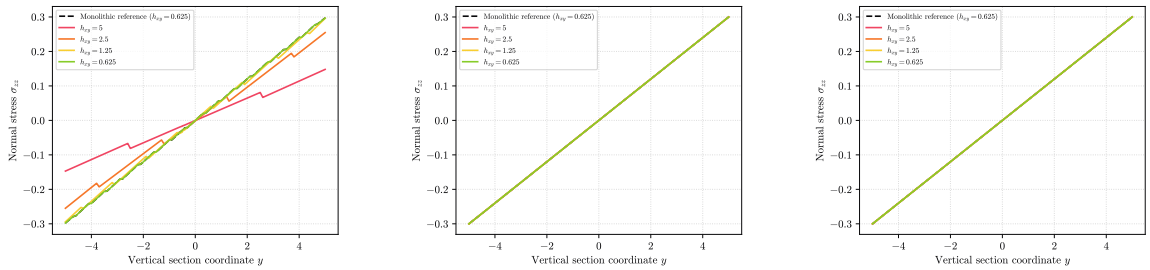
7.4.m Centerline displacement profile



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

Figure 21: Zig-zag interface: centerline displacement profiles under mesh refinement.

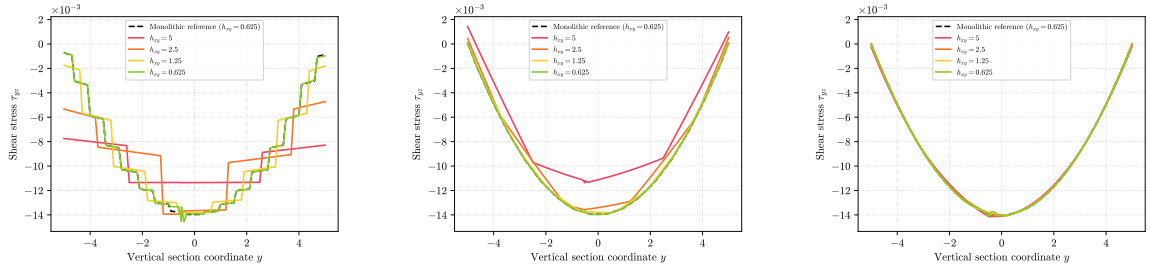
7.4.n Transverse normal-stress profile



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

Figure 22: Zig-zag interface: transverse normal-stress profiles under mesh refinement.

7.4.o Transverse shear-stress profile



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

Figure 23: Zig-zag interface: transverse shear-stress profiles under mesh refinement.

7.4.p Relative differences under refinement

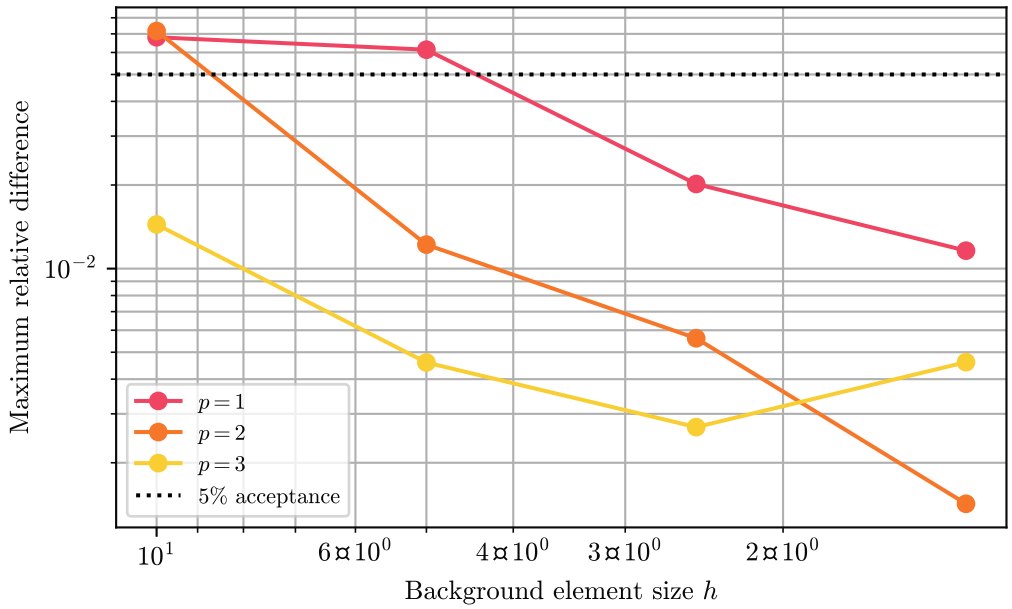


Figure 24: Zig-zag interface: maximum homogeneous-response difference under refinement.

7.5 Nested L interface

7.5.a h=10, p=1

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-1.97×10^{-9}	-2.09×10^{-9}	5.7%
Centerline displacement $\|u_y\|_{L^2}$	9.67×10^{-9}	10.2×10^{-9}	5.46%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.259	0.279	7.17%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	31.7×10^{-3}	31.3×10^{-3}	6.61%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	49.8×10^{-3}	53.6×10^{-3}	8.16%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	37.9×10^{-3}	36.1×10^{-3}	5.33%

7.5.b h=5, p=1

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-3.27×10^{-9}	-3.41×10^{-9}	4.25%
Centerline displacement $\|u_y\|_{L^2}$	15.9×10^{-9}	16.6×10^{-9}	4.2%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.451	0.471	4.5%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	31.1×10^{-3}	30.6×10^{-3}	2.72%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	91.7×10^{-3}	94.4×10^{-3}	5.81%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	44.2×10^{-3}	43.9×10^{-3}	3.01%

7.5.c h=2.5, p=1

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-3.87×10^{-9}	-3.88×10^{-9}	0.236%

Quantity	Measured value	Reference value	Relative difference
Centerline displacement $\|u_y\|_{L^2}$	18.8×10^{-9}	18.8×10^{-9}	0.235%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.531	0.533	0.268%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	31.8×10^{-3}	31.8×10^{-3}	2.08%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	0.108	0.108	1.21%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	46.6×10^{-3}	46.8×10^{-3}	0.705%

7.5.d h=1.25, p=1

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-3.97×10^{-9}	-3.97×10^{-9}	0.042%
Centerline displacement $\|u_y\|_{L^2}$	19.3×10^{-9}	19.3×10^{-9}	0.0421%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.544	0.544	0.153%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.1×10^{-3}	32.1×10^{-3}	0.394%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	90.1×10^{-3}	90.1×10^{-3}	0.22%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	46.7×10^{-3}	46.7×10^{-3}	0.145%

7.5.e h=10, p=2

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-3.99×10^{-9}	-3.99×10^{-9}	0.00611%
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	0.00721%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.106%

Quantity	Measured value	Reference value	Relative difference
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	26.4×10^{-3}	26.7×10^{-3}	5.02%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	95.4×10^{-3}	95.0×10^{-3}	0.896%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	39.1×10^{-3}	37.5×10^{-3}	8.02%

7.5.f h=5, p=2

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	0.00741%
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	0.00917%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.11%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	30.8×10^{-3}	30.8×10^{-3}	3.45%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	95.1×10^{-3}	94.8×10^{-3}	0.459%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	45.2×10^{-3}	45.2×10^{-3}	0.832%

7.5.g h=2.5, p=2

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	$348 \times 10^{-6}\%$
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	$361 \times 10^{-6}\%$
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.0146%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	31.8×10^{-3}	31.8×10^{-3}	1.01%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.9×10^{-3}	94.8×10^{-3}	0.0821%

Quantity	Measured value	Reference value	Relative difference
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	46.8×10^{-3}	46.9×10^{-3}	0.546%

7.5.h h=1.25, p=2

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	$174 \times 10^{-6}\%$
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	$198 \times 10^{-6}\%$
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.00781%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.1×10^{-3}	32.1×10^{-3}	0.147%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.9×10^{-3}	94.9×10^{-3}	0.0388%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	46.9×10^{-3}	46.9×10^{-3}	0.0578%

7.5.i h=10, p=3

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	0.00109%
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	0.00126%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.0291%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.1×10^{-3}	32.0×10^{-3}	0.992%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	95.0×10^{-3}	94.9×10^{-3}	0.433%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	46.9×10^{-3}	47.0×10^{-3}	1.38%

7.5.j h=5, p=3

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	0.00197%
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	0.00234%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.0299%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.2×10^{-3}	32.2×10^{-3}	0.229%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.8×10^{-3}	94.9×10^{-3}	0.191%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	47.0×10^{-3}	47.0×10^{-3}	0.392%

7.5.k h=2.5, p=3

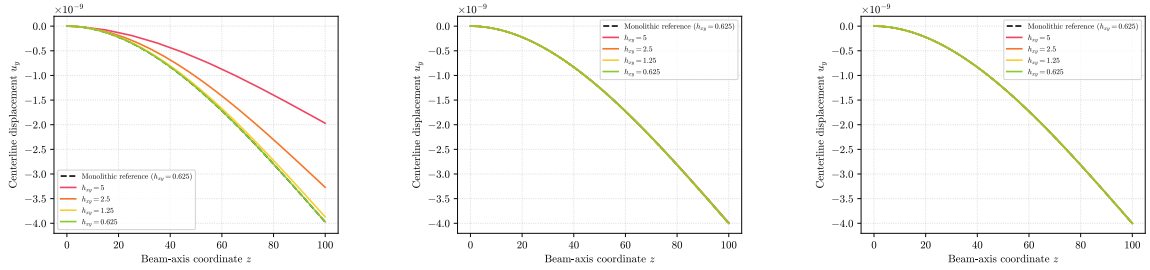
Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	$500 \times 10^{-6}\%$
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	$597 \times 10^{-6}\%$
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.00985%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.2×10^{-3}	32.2×10^{-3}	0.0595%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.9×10^{-3}	94.9×10^{-3}	0.1%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	47.1×10^{-3}	47.1×10^{-3}	0.0749%

7.5.l h=1.25, p=3

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	$230 \times 10^{-6}\%$
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	$271 \times 10^{-6}\%$

Quantity	Measured value	Reference value	Relative difference
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.00192%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.2×10^{-3}	32.2×10^{-3}	0.0289%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.9×10^{-3}	94.9×10^{-3}	0.0136%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	47.1×10^{-3}	47.1×10^{-3}	0.0194%

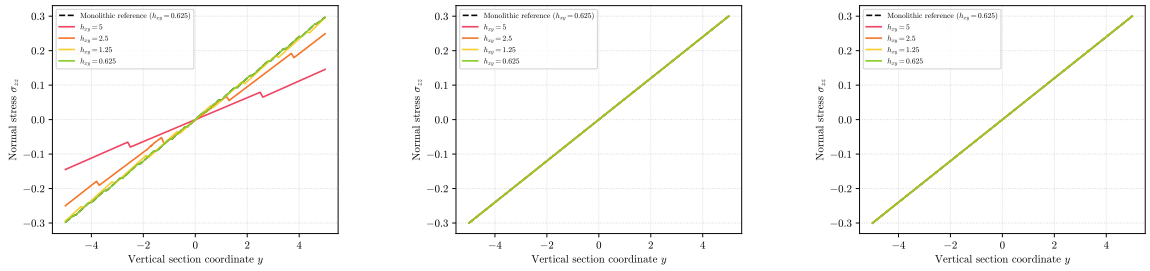
7.5.m Centerline displacement profile



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

Figure 25: Nested L interface: centerline displacement profiles under mesh refinement.

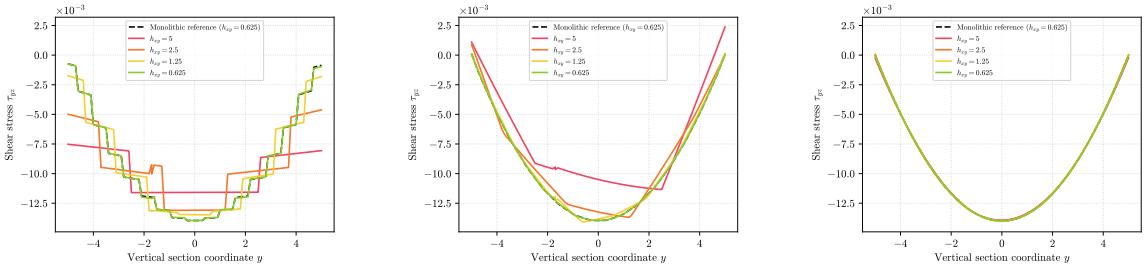
7.5.n Transverse normal-stress profile



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

Figure 26: Nested L interface: transverse normal-stress profiles under mesh refinement.

7.5.o Transverse shear-stress profile



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

Figure 27: Nested L interface: transverse shear-stress profiles under mesh refinement.

7.5.p Relative differences under refinement

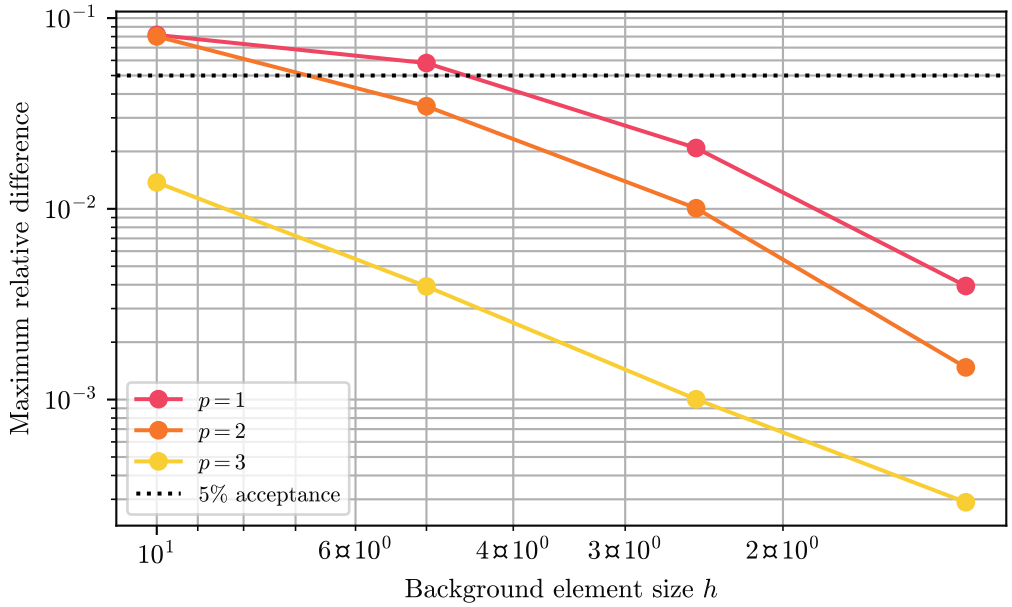


Figure 28: Nested L interface: maximum homogeneous-response difference under refinement.

7.6 Tetris partition

7.6.a h=10, p=1

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-1.93×10^{-9}	-2.09×10^{-9}	7.42%
Centerline displacement $\|u_y\|_{L^2}$	9.50×10^{-9}	10.2×10^{-9}	7.21%

Quantity	Measured value	Reference value	Relative difference
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.255	0.279	8.83%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	31.7×10^{-3}	31.3×10^{-3}	12.1%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	48.9×10^{-3}	53.6×10^{-3}	8.97%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	38.9×10^{-3}	36.1×10^{-3}	8.2%

7.6.b h=5, p=1

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-3.17×10^{-9}	-3.41×10^{-9}	7.15%
Centerline displacement $\|u_y\|_{L^2}$	15.4×10^{-9}	16.6×10^{-9}	7.08%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.435	0.471	7.83%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	31.2×10^{-3}	30.6×10^{-3}	4.9%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	87.0×10^{-3}	94.4×10^{-3}	8.27%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	43.8×10^{-3}	43.9×10^{-3}	1.5%

7.6.c h=2.5, p=1

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-3.86×10^{-9}	-3.88×10^{-9}	0.394%
Centerline displacement $\|u_y\|_{L^2}$	18.8×10^{-9}	18.8×10^{-9}	0.392%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.531	0.533	0.616%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	31.8×10^{-3}	31.8×10^{-3}	1.35%

Quantity	Measured value	Reference value	Relative difference
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	0.107	0.108	1.1%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	46.8×10^{-3}	46.8×10^{-3}	0.0943%

7.6.d h=1.25, p=1

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-3.97×10^{-9}	-3.97×10^{-9}	0.0768%
Centerline displacement $\|u_y\|_{L^2}$	19.3×10^{-9}	19.3×10^{-9}	0.077%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.544	0.544	0.311%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.1×10^{-3}	32.1×10^{-3}	1.13%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	90.1×10^{-3}	90.1×10^{-3}	0.223%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	46.7×10^{-3}	46.7×10^{-3}	0.107%

7.6.e h=10, p=2

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-3.99×10^{-9}	-3.99×10^{-9}	0.0142%
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	0.0161%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.0597%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	26.5×10^{-3}	26.7×10^{-3}	4.67%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.8×10^{-3}	95.0×10^{-3}	0.635%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	37.0×10^{-3}	37.5×10^{-3}	2.77%

7.6.f h=5, p=2

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	0.00511%
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	0.00635%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.0158%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	30.8×10^{-3}	30.8×10^{-3}	0.922%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.6×10^{-3}	94.8×10^{-3}	0.348%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	45.4×10^{-3}	45.2×10^{-3}	0.666%

7.6.g h=2.5, p=2

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	$139 \times 10^{-6}\%$
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	$194 \times 10^{-6}\%$
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.0138%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	31.8×10^{-3}	31.8×10^{-3}	0.349%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.8×10^{-3}	94.8×10^{-3}	0.0555%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	46.9×10^{-3}	46.9×10^{-3}	0.155%

7.6.h h=1.25, p=2

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	$447 \times 10^{-6}\%$
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	$538 \times 10^{-6}\%$

Quantity	Measured value	Reference value	Relative difference
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.00531%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.1×10^{-3}	32.1×10^{-3}	0.335%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.9×10^{-3}	94.9×10^{-3}	0.0253%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	46.9×10^{-3}	46.9×10^{-3}	0.0473%

7.6.i h=10, p=3

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	0.00818%
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	0.00971%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.0348%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.1×10^{-3}	32.0×10^{-3}	1.89%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	95.0×10^{-3}	94.9×10^{-3}	0.155%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	47.0×10^{-3}	47.0×10^{-3}	0.953%

7.6.j h=5, p=3

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	0.00187%
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	0.00225%
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.0112%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.2×10^{-3}	32.2×10^{-3}	0.175%

Quantity	Measured value	Reference value	Relative difference
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.9×10^{-3}	94.9×10^{-3}	0.102%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	47.0×10^{-3}	47.0×10^{-3}	0.0945%

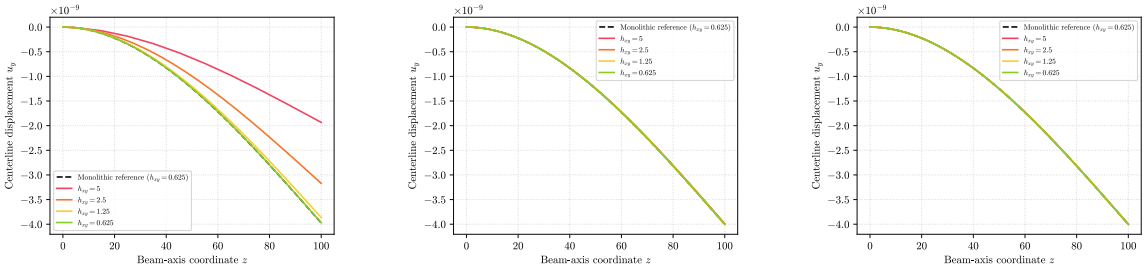
7.6.k h=2.5, p=3

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	$788 \times 10^{-6}\%$
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	$936 \times 10^{-6}\%$
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.0184%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.2×10^{-3}	32.2×10^{-3}	0.366%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.9×10^{-3}	94.9×10^{-3}	0.0806%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	47.1×10^{-3}	47.1×10^{-3}	0.017%

7.6.l h=1.25, p=3

Quantity	Measured value	Reference value	Relative difference
Tip displacement u_y	-4.00×10^{-9}	-4.00×10^{-9}	$267 \times 10^{-6}\%$
Centerline displacement $\|u_y\|_{L^2}$	19.4×10^{-9}	19.4×10^{-9}	$320 \times 10^{-6}\%$
Vertical normal stress $\|\sigma_{zz}\|_{L^2}$	0.548	0.548	0.0033%
Vertical shear stress $\|\tau_{yz}\|_{L^2}$	32.2×10^{-3}	32.2×10^{-3}	0.0264%
Horizontal normal stress $\|\sigma_{zz}\|_{L^2}$	94.9×10^{-3}	94.9×10^{-3}	0.011%
Horizontal shear stress $\|\tau_{yz}\|_{L^2}$	47.1×10^{-3}	47.1×10^{-3}	0.0148%

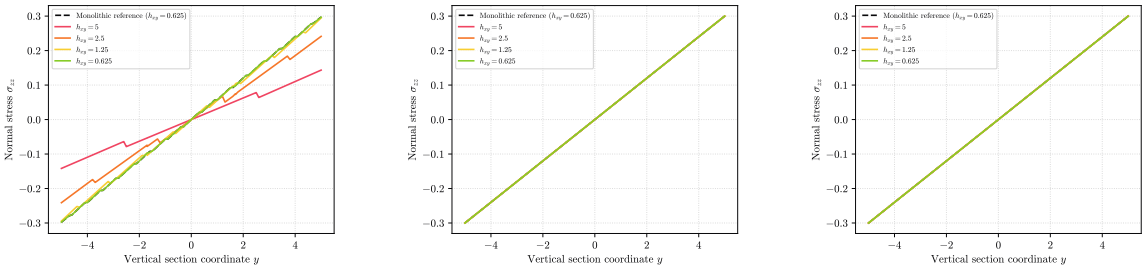
7.6.m Centerline displacement profile



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

Figure 29: Tetris partition: centerline displacement profiles under mesh refinement.

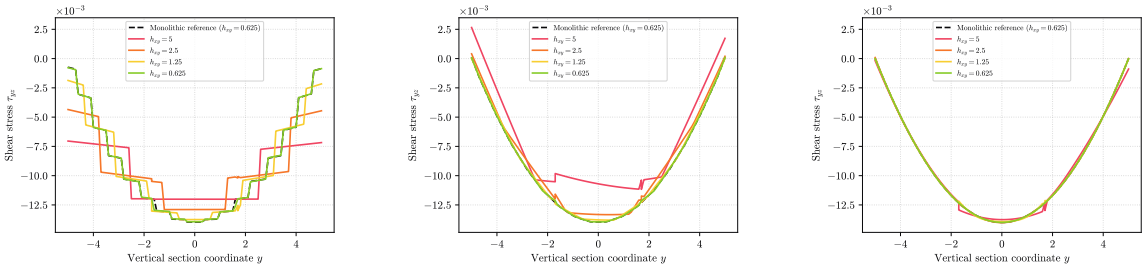
7.6.n Transverse normal-stress profile



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

Figure 30: Tetris partition: transverse normal-stress profiles under mesh refinement.

7.6.o Transverse shear-stress profile



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

Figure 31: Tetris partition: transverse shear-stress profiles under mesh refinement.

7.6.p Relative differences under refinement

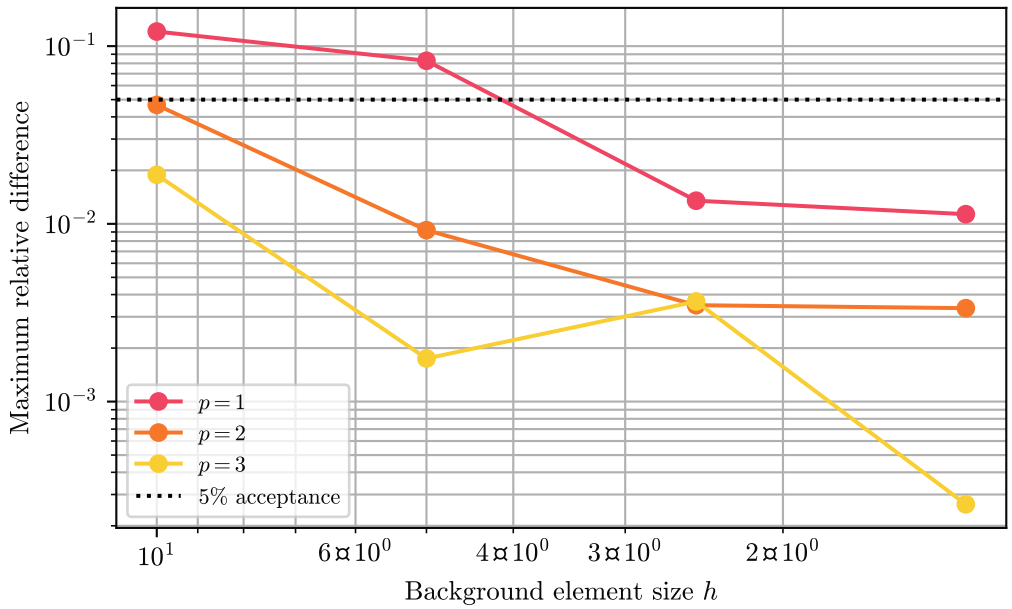


Figure 32: Tetris partition: maximum homogeneous-response difference under refinement.

8 Performance

Trimming and Abaqus solve statistics are reported for every mesh level and degree, grouped by geometry.

8.1 Monolithic reference

Coreform IGA Mesh

8.1.a $p = 1$

h_z	Background	Active	Trimmed	CPUs	Wall-time [s]
10	325	99	90	1	4.1
5	1,127	525	354	2	11.1
2.5	5,203	3,321	1,410	4	33.6
1.25	29,963	23,409	5,634	8	127.4

8.1.b $p = 2$

h_z	Background	Active	Trimmed	CPUs	Wall-time [s]
10	735	99	90	1	4.3
5	2,025	525	354	2	11.3

h_z	Background	Active	Trimmed	CPUs	Wall-time [s]
2.5	7,605	3,321	1,410	4	32.4
1.25	37,485	23,409	5,634	8	130.5

8.1.c $p = 3$

h_z	Background	Active	Trimmed	CPUs	Wall-time [s]
10	1,377	99	90	1	6.9
5	3,267	525	354	2	11.3
2.5	10,575	3,321	1,410	4	35.3
1.25	46,023	23,409	5,634	8	159.8

Coreform IGA for Abaqus solve

8.1.d $p = 1$

h_z	Elements	Nodes	DOFs	Threads	Wall-time [s]
10	579	482	1,446	1	1.0
5	1,137	1,152	3,456	2	2.0
2.5	4,345	4,778	14,334	4	1.0
1.25	26,605	28,296	84,888	8	5.0

8.1.e $p = 2$

h_z	Elements	Nodes	DOFs	Threads	Wall-time [s]
10	575	613	1,839	1	2.0
5	1,137	1,487	4,461	2	1.0
2.5	4,345	5,781	17,343	4	4.0
1.25	27,055	31,916	95,748	8	14.0

8.1.f $p = 3$

h_z	Elements	Nodes	DOFs	Threads	Wall-time [s]
10	571	786	2,358	1	2.0
5	1,137	1,896	5,688	2	5.0
2.5	4,993	7,274	21,822	4	14.0
1.25	29,817	37,002	111,006	8	63.0

8.2 Bottom-centered one-third square

Coreform IGA Mesh

8.2.a $p = 1$

h_z	Background	Active	Trimmed	CPUs	Wall-time [s]
10	325	132	110	1	5.7
5	1,127	630	390	2	15.2
2.5	5,203	3,690	1,638	4	45.9
1.25	29,963	24,786	6,374	8	202.7

8.2.b $p = 2$

h_z	Background	Active	Trimmed	CPUs	Wall-time [s]
10	735	132	110	1	6.3
5	2,025	630	390	2	15.9
2.5	7,605	3,690	1,638	4	42.3
1.25	37,485	24,786	6,374	8	190.0

8.2.c $p = 3$

h_z	Background	Active	Trimmed	CPUs	Wall-time [s]
10	1,377	132	110	1	9.1
5	3,267	630	390	2	18.0
2.5	10,575	3,690	1,638	4	55.6
1.25	46,023	24,786	6,374	8	214.6

Coreform IGA for Abaqus solve

8.2.d $p = 1$

h_z	Elements	Nodes	DOFs	Threads	Wall-time [s]
10	5,556	3,696	11,088	1	2.0
5	7,062	4,974	14,922	2	1.0
2.5	12,406	10,172	30,516	4	3.0
1.25	48,538	42,586	127,758	8	8.0

8.2.e $p = 2$

h_z	Elements	Nodes	DOFs	Threads	Wall-time [s]
10	5,648	3,982	11,946	1	4.0
5	7,302	5,654	16,962	2	2.0
2.5	12,406	11,750	35,250	4	5.0
1.25	50,212	48,647	145,941	8	18.0

8.2.f $p = 3$

h_z	Elements	Nodes	DOFs	Threads	Wall-time [s]
10	5,644	4,299	12,897	1	5.0
5	7,366	6,380	19,140	2	10.0
2.5	15,158	15,020	45,060	4	20.0
1.25	64,942	62,052	186,156	8	79.0

8.3 Bottom-left one-half square

Coreform IGA Mesh

8.3.a $p = 1$

h_z	Background	Active	Trimmed	CPUs	Wall-time [s]
10	325	132	88	1	6.0
5	1,127	630	346	2	15.9
2.5	5,203	3,690	1,378	4	47.3
1.25	29,963	24,786	5,506	8	180.2

8.3.b $p = 2$

h_z	Background	Active	Trimmed	CPUs	Wall-time [s]
10	735	132	88	1	6.4
5	2,025	630	346	2	14.6
2.5	7,605	3,690	1,378	4	56.9
1.25	37,485	24,786	5,506	8	213.3

8.3.c $p = 3$

h_z	Background	Active	Trimmed	CPUs	Wall-time [s]
10	1,377	132	88	1	8.9
5	3,267	630	346	2	15.3
2.5	10,575	3,690	1,378	4	60.9
1.25	46,023	24,786	5,506	8	237.6

Coreform IGA for Abaqus solve

8.3.d $p = 1$

h_z	Elements	Nodes	DOFs	Threads	Wall-time [s]
10	5,534	3,505	10,515	1	3.0
5	6,918	4,738	14,214	2	1.0
2.5	11,522	9,576	28,728	4	2.0
1.25	47,298	41,780	125,340	8	7.0

8.3.e $p = 2$

h_z	Elements	Nodes	DOFs	Threads	Wall-time [s]
10	5,634	3,795	11,385	1	2.0
5	7,078	5,380	16,140	2	2.0
2.5	11,522	11,158	33,474	4	4.0
1.25	48,870	47,776	143,328	8	19.0

8.3.f $p = 3$

h_z	Elements	Nodes	DOFs	Threads	Wall-time [s]
10	5,580	4,090	12,270	1	4.0
5	7,158	6,118	18,354	2	7.0
2.5	14,494	14,548	43,644	4	19.0
1.25	63,590	61,092	183,276	8	76.0

8.4 Centered one-third square

Coreform IGA Mesh

8.4.a $p = 1$

h_z	Background	Active	Trimmed	CPUs	Wall-time [s]
10	325	110	99	1	4.8
5	1,127	693	504	2	20.0
2.5	5,203	3,649	1,720	4	46.6
1.25	29,963	25,353	7,480	8	223.0

8.4.b $p = 2$

h_z	Background	Active	Trimmed	CPUs	Wall-time [s]
10	735	110	99	1	5.7
5	2,025	693	504	2	20.7
2.5	7,605	3,649	1,720	4	57.6
1.25	37,485	25,353	7,480	8	224.6

8.4.c $p = 3$

h_z	Background	Active	Trimmed	CPUs	Wall-time [s]
10	1,377	110	99	1	9.0
5	3,267	693	504	2	22.7
2.5	10,575	3,649	1,720	4	50.6
1.25	46,023	25,353	7,480	8	267.5

Coreform IGA for Abaqus solve

8.4.d $p = 1$

h_z	Elements	Nodes	DOFs	Threads	Wall-time [s]
10	6,518	4,334	13,002	1	4.0
5	9,993	6,672	20,016	2	3.0
2.5	14,513	11,442	34,326	4	2.0
1.25	57,941	48,232	144,696	8	9.0

8.4.e $p = 2$

h_z	Elements	Nodes	DOFs	Threads	Wall-time [s]
10	6,642	4,614	13,842	1	3.0

h_z	Elements	Nodes	DOFs	Threads	Wall-time [s]
5	10,249	7,362	22,086	2	3.0
2.5	14,513	12,848	38,544	4	4.0
1.25	60,119	54,816	164,448	8	22.0

8.4.f $p = 3$

h_z	Elements	Nodes	DOFs	Threads	Wall-time [s]
10	6,344	4,743	14,229	1	6.0
5	10,377	8,120	24,360	2	13.0
2.5	17,609	16,122	48,366	4	20.0
1.25	78,465	70,226	210,678	8	96.0

8.5 Zig-zag interface

Coreform IGA Mesh

8.5.a $p = 1$

h_z	Background	Active	Trimmed	CPUs	Wall-time [s]
10	325	132	66	1	5.9
5	1,127	630	258	2	16.2
2.5	5,203	3,690	1,026	4	53.4
1.25	29,963	24,786	4,098	8	210.2

8.5.b $p = 2$

h_z	Background	Active	Trimmed	CPUs	Wall-time [s]
10	735	132	66	1	6.5
5	2,025	630	258	2	16.7
2.5	7,605	3,690	1,026	4	53.0
1.25	37,485	24,786	4,098	8	173.7

8.5.c $p = 3$

h_z	Background	Active	Trimmed	CPUs	Wall-time [s]
10	1,377	132	66	1	9.5
5	3,267	630	258	2	14.9

h_z	Background	Active	Trimmed	CPUs	Wall-time [s]
2.5	10,575	3,690	1,026	4	51.7
1.25	46,023	24,786	4,098	8	231.7

Coreform IGA for Abaqus solve

8.5.d $p = 1$

h_z	Elements	Nodes	DOFs	Threads	Wall-time [s]
10	6,200	4,026	12,078	1	2.0
5	7,442	5,212	15,636	2	3.0
2.5	13,514	10,830	32,490	4	3.0
1.25	51,154	44,414	133,242	8	7.0

8.5.e $p = 2$

h_z	Elements	Nodes	DOFs	Threads	Wall-time [s]
10	6,310	4,323	12,969	1	3.0
5	7,610	5,904	17,712	2	3.0
2.5	13,514	12,498	37,494	4	6.0
1.25	53,138	51,132	153,396	8	20.0

8.5.f $p = 3$

h_z	Elements	Nodes	DOFs	Threads	Wall-time [s]
10	6,278	4,629	13,887	1	6.0
5	8,038	6,868	20,604	2	8.0
2.5	16,002	15,734	47,202	4	21.0
1.25	69,778	66,026	198,078	8	84.0

8.6 Nested L interface

Coreform IGA Mesh

8.6.a $p = 1$

h_z	Background	Active	Trimmed	CPUs	Wall-time [s]
10	325	132	66	1	6.0
5	1,127	672	298	2	16.7

h_z	Background	Active	Trimmed	CPUs	Wall-time [s]
2.5	5,203	3,772	1,106	4	47.9
1.25	29,963	25,272	4,578	8	238.8

8.6.b $p = 2$

h_z	Background	Active	Trimmed	CPUs	Wall-time [s]
10	735	132	66	1	6.4
5	2,025	672	298	2	18.1
2.5	7,605	3,772	1,106	4	57.1
1.25	37,485	25,272	4,578	8	234.9

8.6.c $p = 3$

h_z	Background	Active	Trimmed	CPUs	Wall-time [s]
10	1,377	132	66	1	9.8
5	3,267	672	298	2	18.8
2.5	10,575	3,772	1,106	4	60.4
1.25	46,023	25,272	4,578	8	262.9

Coreform IGA for Abaqus solve

8.6.d $p = 1$

h_z	Elements	Nodes	DOFs	Threads	Wall-time [s]
10	7,202	4,539	13,617	1	3.0
5	9,148	6,056	18,168	2	3.0
2.5	14,108	11,170	33,510	4	2.0
1.25	55,176	46,522	139,566	8	8.0

8.6.e $p = 2$

h_z	Elements	Nodes	DOFs	Threads	Wall-time [s]
10	7,336	4,848	14,544	1	3.0
5	9,372	6,776	20,328	2	4.0
2.5	14,108	12,840	38,520	4	6.0
1.25	57,200	53,264	159,792	8	22.0

8.6.f $p = 3$

h_z	Elements	Nodes	DOFs	Threads	Wall-time [s]
10	$7,204$	$5,104$	$15,312$	1	6.0
5	$9,484$	$7,578$	$22,734$	2	10.0
2.5	$17,944$	$16,764$	$50,292$	4	22.0
1.25	$75,792$	$69,142$	$207,426$	8	91.0

8.7 Tetris partition

Coreform IGA Mesh

8.7.a $p = 1$

h_z	Background	Active	Trimmed	CPUs	Wall-time [s]
10	325	143	66	1	6.6
5	$1,127$	777	294	2	22.4
2.5	$5,203$	$3,977$	$1,102$	4	58.5
1.25	$29,963$	$26,325$	$4,542$	8	238.3

8.7.b $p = 2$

h_z	Background	Active	Trimmed	CPUs	Wall-time [s]
10	735	143	66	1	6.9
5	$2,025$	777	294	2	22.6
2.5	$7,605$	$3,977$	$1,102$	4	62.7
1.25	$37,485$	$26,325$	$4,542$	8	262.6

8.7.c $p = 3$

h_z	Background	Active	Trimmed	CPUs	Wall-time [s]
10	$1,377$	143	66	1	10.1
5	$3,267$	777	294	2	23.1
2.5	$10,575$	$3,977$	$1,102$	4	65.9
1.25	$46,023$	$26,325$	$4,542$	8	311.6

Coreform IGA for Abaqus solve

8.7.d $p = 1$

h_z	Elements	Nodes	DOFs	Threads	Wall-time [s]
10	10,513	6,895	20,685	1	4.0
5	13,721	9,176	27,528	2	2.0
2.5	20,069	15,330	45,990	4	2.0
1.25	72,117	57,780	173,340	8	10.0

8.7.e $p = 2$

h_z	Elements	Nodes	DOFs	Threads	Wall-time [s]
10	10,707	7,315	21,945	1	6.0
5	14,113	10,201	30,603	2	5.0
2.5	20,069	17,399	52,197	4	6.0
1.25	75,087	66,478	199,434	8	26.0

8.7.f $p = 3$

h_z	Elements	Nodes	DOFs	Threads	Wall-time [s]
10	10,483	7,638	22,914	1	10.0
5	14,285	11,314	33,942	2	16.0
2.5	24,797	22,294	66,882	4	26.0
1.25	101,505	88,218	264,654	8	113.0

9 Discussion

Because all material definitions are identical, the exact continuum response is independent of the internal cell decomposition. Differences from the monolithic result therefore measure numerical sensitivity to retained interfaces, including closed inclusions, re-entrant partition corners, diagonal interfaces, and three-material junctions. The full refinement history is retained so that a passing finest-level result can be distinguished from a coarse-grid coincidence and so regressions at individual interface topologies remain visible.

References

[1] J. M. Gere and S. P. Timoshenko, *Mechanics of materials*, 4th ed. Boston: PWS Publishing Company, 1997.

Appendix

9.1 Capabilities exercised

The table is generated from current passing simulation and study 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 4: Capabilities exercised by the current verification artifacts.

Capability	Evidence level
Linear static analysis	Exercised
Static stress analysis	Exercised
Boundary conditions and constraints	Exercised
Pinned boundary condition	Exercised
Threaded Abaqus/Standard execution	Exercised
Parallel Coreform IGA mesh generation	Exercised
Parallel execution	Exercised
Surface traction loading	Exercised
Mechanical loads	Exercised
Cell-based material section assignment	Exercised
Multi-cell material interfaces	Numerically validated
Linear elastic material behavior	Exercised
Materials and section assignments	Numerically validated
Meshing	Exercised
Linear C0 spline basis	Exercised
Quadratic C1 spline basis	Exercised
Cubic C2 spline basis	Exercised
Immersed rectilinear meshes	Exercised
Spline basis degree and continuity	Exercised
Explicit field-output selection	Exercised
Field output requests	Exercised
Stress field output (S)	Exercised
Displacement field output (U)	Exercised
Individual field-output variables	Exercised
Line probes	Exercised
Coreform IGA result probes	Exercised
Boolean merge with retained boundaries	Exercised
Dependent part instances	Exercised

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 monolithic $h_0 p_2$ test with comments stripped and instance-specific names redacted.

multiplanar_material_interfaces_monolithic_h0.inp - outline

```
*Heading
*Preprint, echo=NO, model=NO, history=NO, contact=NO
*Include, input=<iga-mesh-inp>
*System
*Material, name=<material>
*Elastic
 1e+11, 0.3
*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 simulation and study CTest reported on this page.

Test_abaqus_verification_multiplanar_material_interfaces_bottom_center_third_h0p1

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (0 positive)
Test date	26-Aug-2026 11:29:21
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_bottom_center_third_h1p1

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (0 positive)
Test date	26-Aug-2026 11:45:18
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_bottom_center_third_h2p1

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:14:51
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_bottom_center_third_h3p1

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:46:33
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_bottom_center_third_h0p2

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 11:29:55
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_bottom_center_third_h1p2

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 11:46:57
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_bottom_center_third_h2p2

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:15:12
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_bottom_center_third_h3p2

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:46:52
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_bottom_center_third_h0p3

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 11:30:13
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_bottom_center_third_h1p3

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 11:49:56
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_bottom_center_third_h2p3

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:16:15
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_bottom_center_third_h3p3

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:48:24
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_bottom_left_half_h0p1

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (0 positive)
Test date	26-Aug-2026 11:30:10
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_bottom_left_half_h1p1

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (0 positive)
Test date	26-Aug-2026 11:57:52
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_bottom_left_half_h2p1

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:16:09
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_bottom_left_half_h3p1

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:50:05
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_bottom_left_half_h0p2

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 11:30:26
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_bottom_left_half_h1p2

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:01:21
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_bottom_left_half_h2p2

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:17:18
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_bottom_left_half_h3p2

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:52:34
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_bottom_left_half_h0p3

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 11:30:34
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_bottom_left_half_h1p3

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:04:24
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_bottom_left_half_h2p3

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:17:43
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_bottom_left_half_h3p3

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:54:18
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_centered_third_h0p1

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (0 positive)
Test date	26-Aug-2026 11:30:41
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_centered_third_h1p1

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (0 positive)
Test date	26-Aug-2026 12:04:21
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_centered_third_h2p1

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:18:15
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_centered_third_h3p1

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:53:24
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_centered_third_h0p2

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 11:30:51
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_centered_third_h1p2

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:05:24
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_centered_third_h2p2

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:18:53
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_centered_third_h3p2

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:54:21
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_centered_third_h0p3

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 11:31:04
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_centered_third_h1p3

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:05:36
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_centered_third_h2p3

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:19:33
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_centered_third_h3p3

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:58:50
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_monolithic_h0p1

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (0 positive)
Test date	26-Aug-2026 11:27:52
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_monolithic_h1p1

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (0 positive)
Test date	26-Aug-2026 11:44:36
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_monolithic_h2p1

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:13:11
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_monolithic_h3p1

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:42:54
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_monolithic_h0p2

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 11:28:06
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_monolithic_h1p2

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 11:44:54
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_monolithic_h2p2

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:13:55
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_monolithic_h3p2

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:43:14
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_monolithic_h0p3

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 11:29:09
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_monolithic_h1p3

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 11:45:00
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_monolithic_h2p3

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:14:17
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_monolithic_h3p3

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:45:19
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_nested_l_h0p1

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (0 positive)
Test date	26-Aug-2026 11:31:36
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_nested_l_h1p1

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (0 positive)
Test date	26-Aug-2026 12:06:45
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_nested_l_h2p1

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:21:37
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_nested_l_h3p1

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 13:07:56
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_nested_l_h0p2

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 11:31:47
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_nested_l_h1p2

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:07:04
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_nested_l_h2p2

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:22:28
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_nested_l_h3p2

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 13:08:40
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_nested_l_h0p3

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 11:32:01
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_nested_l_h1p3

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:07:22
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_nested_l_h2p3

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:23:08
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_nested_l_h3p3

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 13:11:28
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_tetris_h0p1

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (0 positive)
Test date	26-Aug-2026 11:32:05
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_tetris_h1p1

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (0 positive)
Test date	26-Aug-2026 12:07:36
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_tetris_h2p1

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:23:37
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_tetris_h3p1

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 13:15:09
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_tetris_h0p2

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 11:32:20
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_tetris_h1p2

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:07:58
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

ℹ Test_abaqus_verification_multiplanar_material_interfaces_tetris_h2p2

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:24:25
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

ℹ Test_abaqus_verification_multiplanar_material_interfaces_tetris_h3p2

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 13:19:56
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_tetris_h0p3

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 11:32:31
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_tetris_h1p3

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:08:23
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_tetris_h2p3

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:25:16
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_tetris_h3p3

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 13:22:59
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_zig_zag_h0p1

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (0 positive)
Test date	26-Aug-2026 11:31:07
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_zig_zag_h1p1

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (0 positive)
Test date	26-Aug-2026 12:06:19
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_zig_zag_h2p1

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:19:58
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_zig_zag_h3p1

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:57:10
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_zig_zag_h0p2

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 11:31:21
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_zig_zag_h1p2

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:06:03
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_zig_zag_h2p2

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:20:39
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_zig_zag_h3p2

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:57:42
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_zig_zag_h0p3

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 11:31:30
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_zig_zag_h1p3

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:06:35
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_zig_zag_h2p3

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:21:18
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

Test_abaqus_verification_multiplanar_material_interfaces_zig_zag_h3p3

Parameter	Value
Evidence type	Record-only diagnostic
CTest result	Passed (Release)
Verification result	Not asserted — 1 record-only check (1 positive)
Test date	26-Aug-2026 12:59:51
Operating system	Ubuntu 26.04 LTS
Coreform IGA version	`2026.8-dev+tewk_1787764370`
Source revision	`bb2d69b00831`
Abaqus version	`Abaqus 6.26-4`

i
Test_abaqus_verification_study_multiplanar_material_interfaces_bottom_center_third_p1

Parameter	Value
Evidence type	Numerical verification
CTest result	Passed (Release)
Verification result	Passed — 1/1 enforced criterion passed
Test date	26-Aug-2026 19:29:55 UTC
Operating system	—
Coreform IGA version	Not applicable — postprocessing-only CTest
Source revision	`bb2d69b00831`
Abaqus version	Not applicable — postprocessing-only CTest

i
Test_abaqus_verification_study_multiplanar_material_interfaces_bottom_center_third_p2

Parameter	Value
Evidence type	Numerical verification
CTest result	Passed (Release)
Verification result	Passed — 1/1 enforced criterion passed
Test date	26-Aug-2026 19:29:55 UTC
Operating system	—
Coreform IGA version	Not applicable — postprocessing-only CTest
Source revision	`bb2d69b00831`
Abaqus version	Not applicable — postprocessing-only CTest

i
Test_abaqus_verification_study_multiplanar_material_interfaces_bottom_center_third_p3

Parameter	Value
Evidence type	Numerical verification
CTest result	Passed (Release)
Verification result	Passed — 1/1 enforced criterion passed
Test date	26-Aug-2026 19:29:55 UTC
Operating system	—
Coreform IGA version	Not applicable — postprocessing-only CTest
Source revision	`bb2d69b00831`
Abaqus version	Not applicable — postprocessing-only CTest

i Test_abaqus_verification_study_multiplanar_material_interfaces_bottom_left_half_p1

Parameter	Value
Evidence type	Numerical verification
CTest result	Passed (Release)
Verification result	Passed — 1/1 enforced criterion passed
Test date	26-Aug-2026 19:29:55 UTC
Operating system	—
Coreform IGA version	Not applicable — postprocessing-only CTest
Source revision	`bb2d69b00831`
Abaqus version	Not applicable — postprocessing-only CTest

i Test_abaqus_verification_study_multiplanar_material_interfaces_bottom_left_half_p2

Parameter	Value
Evidence type	Numerical verification
CTest result	Passed (Release)
Verification result	Passed — 1/1 enforced criterion passed
Test date	26-Aug-2026 19:29:55 UTC
Operating system	—
Coreform IGA version	Not applicable — postprocessing-only CTest
Source revision	`bb2d69b00831`
Abaqus version	Not applicable — postprocessing-only CTest

i Test_abaqus_verification_study_multiplanar_material_interfaces_bottom_left_half_p3

Parameter	Value
Evidence type	Numerical verification
CTest result	Passed (Release)
Verification result	Passed — 1/1 enforced criterion passed
Test date	26-Aug-2026 19:29:55 UTC
Operating system	—
Coreform IGA version	Not applicable — postprocessing-only CTest
Source revision	`bb2d69b00831`
Abaqus version	Not applicable — postprocessing-only CTest

Test_abaqus_verification_study_multiplanar_material_interfaces_centered_third_p1

Parameter	Value
Evidence type	Numerical verification
CTest result	Passed (Release)
Verification result	Passed — 1/1 enforced criterion passed
Test date	26-Aug-2026 19:29:55 UTC
Operating system	—
Coreform IGA version	Not applicable — postprocessing-only CTest
Source revision	`bb2d69b00831`
Abaqus version	Not applicable — postprocessing-only CTest

Test_abaqus_verification_study_multiplanar_material_interfaces_centered_third_p2

Parameter	Value
Evidence type	Numerical verification
CTest result	Passed (Release)
Verification result	Passed — 1/1 enforced criterion passed
Test date	26-Aug-2026 19:29:55 UTC
Operating system	—
Coreform IGA version	Not applicable — postprocessing-only CTest
Source revision	`bb2d69b00831`
Abaqus version	Not applicable — postprocessing-only CTest

Test_abaqus_verification_study_multiplanar_material_interfaces_centered_third_p3

Parameter	Value
Evidence type	Numerical verification
CTest result	Passed (Release)
Verification result	Passed — 1/1 enforced criterion passed
Test date	26-Aug-2026 19:29:55 UTC
Operating system	—
Coreform IGA version	Not applicable — postprocessing-only CTest
Source revision	`bb2d69b00831`
Abaqus version	Not applicable — postprocessing-only CTest

Test_abaqus_verification_study_multiplanar_material_interfaces_nested_l_p1

Parameter	Value
Evidence type	Numerical verification
CTest result	Passed (Release)
Verification result	Passed — 1/1 enforced criterion passed
Test date	26-Aug-2026 19:29:55 UTC
Operating system	—
Coreform IGA version	Not applicable — postprocessing-only CTest
Source revision	`bb2d69b00831`
Abaqus version	Not applicable — postprocessing-only CTest

i Test_abaqus_verification_study_multiplanar_material_interfaces_nested_l_p2

Parameter	Value
Evidence type	Numerical verification
CTest result	Passed (Release)
Verification result	Passed — 1/1 enforced criterion passed
Test date	26-Aug-2026 19:29:55 UTC
Operating system	—
Coreform IGA version	Not applicable — postprocessing-only CTest
Source revision	`bb2d69b00831`
Abaqus version	Not applicable — postprocessing-only CTest

i Test_abaqus_verification_study_multiplanar_material_interfaces_nested_l_p3

Parameter	Value
Evidence type	Numerical verification
CTest result	Passed (Release)
Verification result	Passed — 1/1 enforced criterion passed
Test date	26-Aug-2026 19:29:55 UTC
Operating system	—
Coreform IGA version	Not applicable — postprocessing-only CTest
Source revision	`bb2d69b00831`
Abaqus version	Not applicable — postprocessing-only CTest

Test_abaqus_verification_study_multiplanar_material_interfaces_tetris_p1

Parameter	Value
Evidence type	Numerical verification
CTest result	Passed (Release)
Verification result	Passed — 1/1 enforced criterion passed
Test date	26-Aug-2026 19:29:55 UTC
Operating system	—
Coreform IGA version	Not applicable — postprocessing-only CTest
Source revision	`bb2d69b00831`
Abaqus version	Not applicable — postprocessing-only CTest

Test_abaqus_verification_study_multiplanar_material_interfaces_tetris_p2

Parameter	Value
Evidence type	Numerical verification
CTest result	Passed (Release)
Verification result	Passed — 1/1 enforced criterion passed
Test date	26-Aug-2026 19:29:55 UTC
Operating system	—
Coreform IGA version	Not applicable — postprocessing-only CTest
Source revision	`bb2d69b00831`
Abaqus version	Not applicable — postprocessing-only CTest

Test_abaqus_verification_study_multiplanar_material_interfaces_tetris_p3

Parameter	Value
Evidence type	Numerical verification
CTest result	Passed (Release)
Verification result	Passed — 1/1 enforced criterion passed
Test date	26-Aug-2026 19:29:55 UTC
Operating system	—
Coreform IGA version	Not applicable — postprocessing-only CTest
Source revision	`bb2d69b00831`
Abaqus version	Not applicable — postprocessing-only CTest

Test_abaqus_verification_study_multiplanar_material_interfaces_zig_zag_p1

Parameter	Value
Evidence type	Numerical verification
CTest result	Passed (Release)
Verification result	Passed — 1/1 enforced criterion passed
Test date	26-Aug-2026 19:29:55 UTC
Operating system	—
Coreform IGA version	Not applicable — postprocessing-only CTest
Source revision	`bb2d69b00831`
Abaqus version	Not applicable — postprocessing-only CTest

Test_abaqus_verification_study_multiplanar_material_interfaces_zig_zag_p2

Parameter	Value
Evidence type	Numerical verification
CTest result	Passed (Release)
Verification result	Passed — 1/1 enforced criterion passed
Test date	26-Aug-2026 19:29:55 UTC
Operating system	—
Coreform IGA version	Not applicable — postprocessing-only CTest
Source revision	`bb2d69b00831`
Abaqus version	Not applicable — postprocessing-only CTest

Test_abaqus_verification_study_multiplanar_material_interfaces_zig_zag_p3

Parameter	Value
Evidence type	Numerical verification
CTest result	Passed (Release)
Verification result	Passed — 1/1 enforced criterion passed
Test date	26-Aug-2026 19:29:55 UTC
Operating system	—
Coreform IGA version	Not applicable — postprocessing-only CTest
Source revision	`bb2d69b00831`
Abaqus version	Not applicable — postprocessing-only CTest