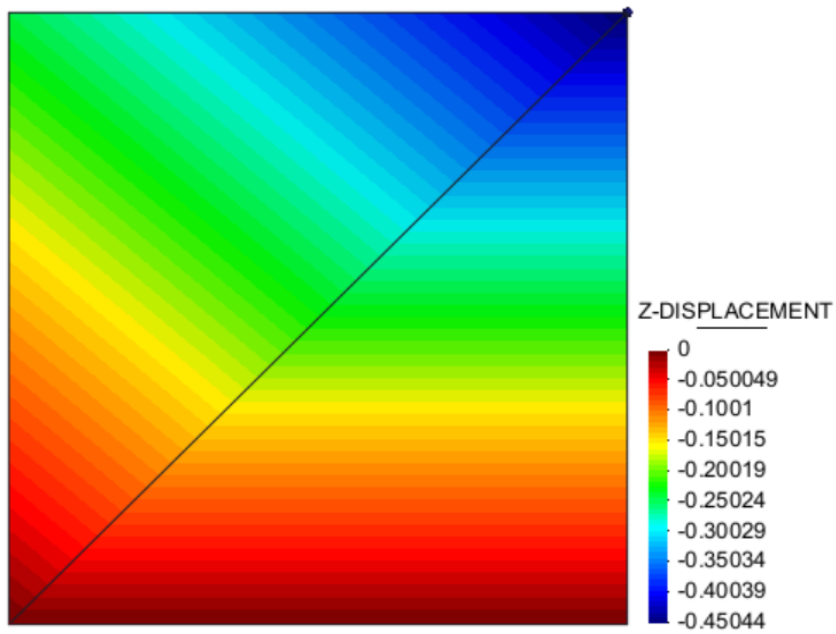


Rectangle test case:

Square is 1x1, bottom edge fully fixed, all rot_Z fixed,
point load of $F_z = -0.01$ applied to top right corner
 $E = 1000$, $\nu = 0.0$, $t = 0.05$, $L/t = 20$

Kratos thin element

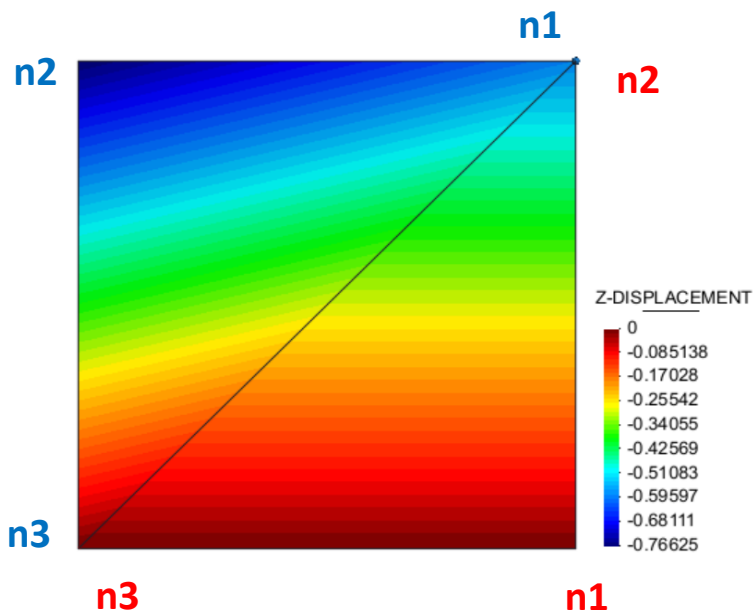


DSGc3 element (with bubble mode)

default node ordering

Element 1: bottom right
Node 1: bottom right
Node 2: top right
Node 3: bottom left
(anticlockwise ordering)

Element 2: top left
Node 1: top right
Node 2: top left
Node 3: bottom left
(anticlockwise ordering)



DSGc3 element 1 shear stiffness matrix

Printing element shear K to Bletzinger Maple DOFs!

6.94	-3.47	-3.47	-1.74	-1.74	0.00	-1.74	0.00	-1.74
-3.47	6.94	-3.47	1.74	3.47	1.74	0.00	-1.74	-1.74
-3.47	-3.47	6.94	0.00	-1.74	-1.74	1.74	1.74	3.47
-1.74	1.74	0.00	0.87	0.87	0.00	0.00	0.00	0.00
-1.74	3.47	-1.74	0.87	1.74	0.87	0.00	-0.87	-0.87
0.00	1.74	-1.74	0.00	0.87	0.87	0.00	-0.87	-0.87
-1.74	0.00	1.74	0.00	0.00	0.00	0.87	0.00	0.87
0.00	-1.74	1.74	0.00	-0.87	-0.87	0.00	0.87	0.87
-1.74	-1.74	3.47	0.00	-0.87	-0.87	0.87	0.87	1.74

DSGc3 element 2 shear stiffness matrix

Printing element shear K to Bletzinger Maple DOFs!

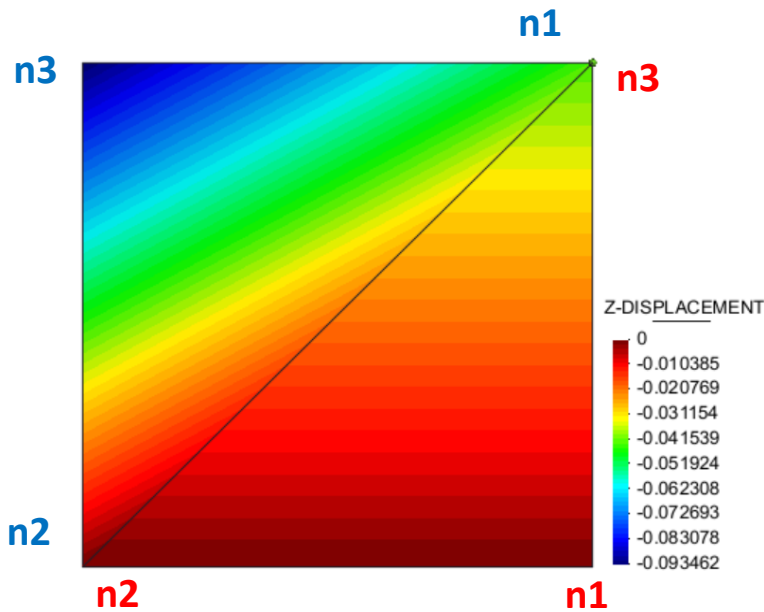
10.42	-6.94	-3.47	-1.74	-3.47	-1.74	-3.47	1.74	-1.74
-6.94	17.36	-10.42	6.94	8.68	1.74	-3.47	-1.74	-5.21
-3.47	-10.42	13.89	-5.21	-5.21	0.00	6.94	-0.00	6.94
-1.74	6.94	-5.21	3.47	3.47	0.00	-2.60	0.00	-2.60
-3.47	8.68	-5.21	3.47	4.34	0.87	-1.74	-0.87	-2.60
-1.74	1.74	0.00	0.00	0.87	0.87	0.87	-0.87	0.00
-3.47	-3.47	6.94	-2.60	-1.74	0.87	4.34	-0.87	3.47
1.74	-1.74	-0.00	0.00	-0.87	-0.87	-0.87	0.87	-0.00
-1.74	-5.21	6.94	-2.60	-2.60	0.00	3.47	-0.00	3.47

DSGc3 element (with bubble mode)

default node ordering reversed

Element 1: bottom right
 Node 1: bottom right
 Node 2: bottom left
 Node 3: top right
 (clockwise ordering)

Element 2: top left
 Node 1: top right
 Node 2: bottom left
 Node 3: top left
 (clockwise ordering)



DSGc3 element 1 shear stiffness matrix

Printing element shear K to Bletzing Maple DOFs!

6.94	-3.47	-3.47	-1.74	-1.74	0.00	-1.74	0.00	-1.74
-3.47	6.94	-3.47	1.74	3.47	1.74	0.00	-1.74	-1.74
-3.47	-3.47	6.94	0.00	-1.74	-1.74	1.74	1.74	3.47
-1.74	1.74	0.00	0.87	0.87	0.00	0.00	0.00	0.00
-1.74	3.47	-1.74	0.87	1.74	0.87	0.00	-0.87	-0.87
0.00	1.74	-1.74	0.00	0.87	0.87	0.00	-0.87	-0.87
-1.74	0.00	1.74	0.00	0.00	0.00	0.87	0.00	0.87
0.00	-1.74	1.74	0.00	-0.87	-0.87	0.00	0.87	0.87
-1.74	-1.74	3.47	0.00	-0.87	-0.87	0.87	0.87	1.74

DSGc3 element 2 shear stiffness matrix

Printing element shear K to Bletzing Maple DOFs!

10.42	-3.47	-6.94	0.00	-1.74	-1.74	-5.21	1.74	-3.47
-3.47	13.89	-10.42	4.34	6.94	2.60	-2.60	-2.60	-5.21
-6.94	-10.42	17.36	-4.34	-5.21	-0.87	7.81	0.87	8.68
0.00	4.34	-4.34	1.74	2.17	0.43	-1.74	-0.43	-2.17
-1.74	6.94	-5.21	2.17	3.47	1.30	-1.30	-1.30	-2.60
-1.74	2.60	-0.87	0.43	1.30	0.87	0.43	-0.87	-0.43
-5.21	-2.60	7.81	-1.74	-1.30	0.43	4.34	-0.43	3.91
1.74	-2.60	0.87	-0.43	-1.30	-0.87	-0.43	0.87	0.43
-3.47	-5.21	8.68	-2.17	-2.60	-0.43	3.91	0.43	4.34

DSGc3 element (with bubble mode)

changed so n1 of e2 is at top left corner

Element 1: bottom right

Node 1: bottom right

Node 2: top right

Node 3: bottom left

(anticlockwise ordering)

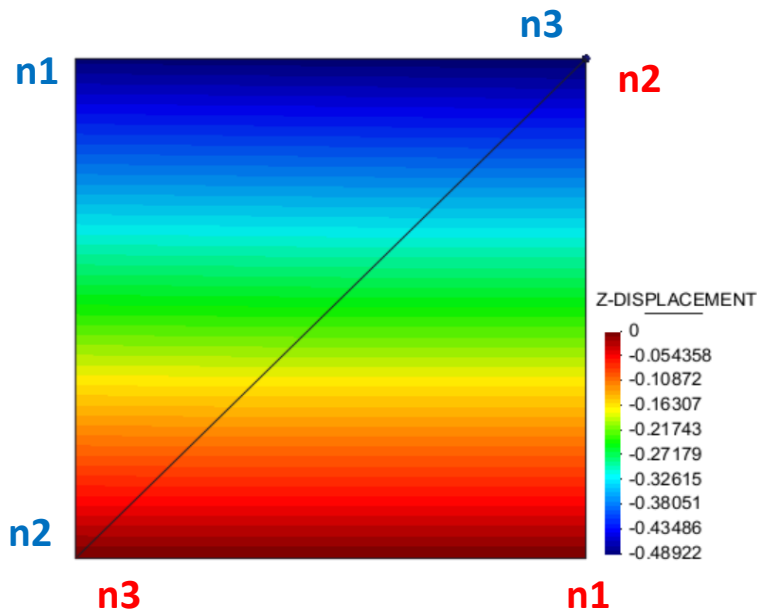
Element 2: top left

Node 1: top left

Node 2: bottom left

Node 3: top right

(anticlockwise ordering)



DSGc3 element 1 shear stiffness matrix

Printing element shear K to Bletzinger Maple DOFs!

6.94	-3.47	-3.47	-1.74	-1.74	0.00	-1.74	0.00	-1.74
-3.47	6.94	-3.47	1.74	3.47	1.74	0.00	-1.74	-1.74
-3.47	-3.47	6.94	0.00	-1.74	-1.74	1.74	1.74	3.47
-1.74	1.74	0.00	0.87	0.87	0.00	0.00	0.00	0.00
-1.74	3.47	-1.74	0.87	1.74	0.87	0.00	-0.87	-0.87
0.00	1.74	-1.74	0.00	0.87	0.87	0.00	-0.87	-0.87
-1.74	0.00	1.74	0.00	0.00	0.00	0.87	0.00	0.87
0.00	-1.74	1.74	0.00	-0.87	-0.87	0.00	0.87	0.87
-1.74	-1.74	3.47	0.00	-0.87	-0.87	0.87	0.87	1.74

DSGc3 element 2 shear stiffness matrix

Printing element shear K to Bletzinger Maple DOFs!

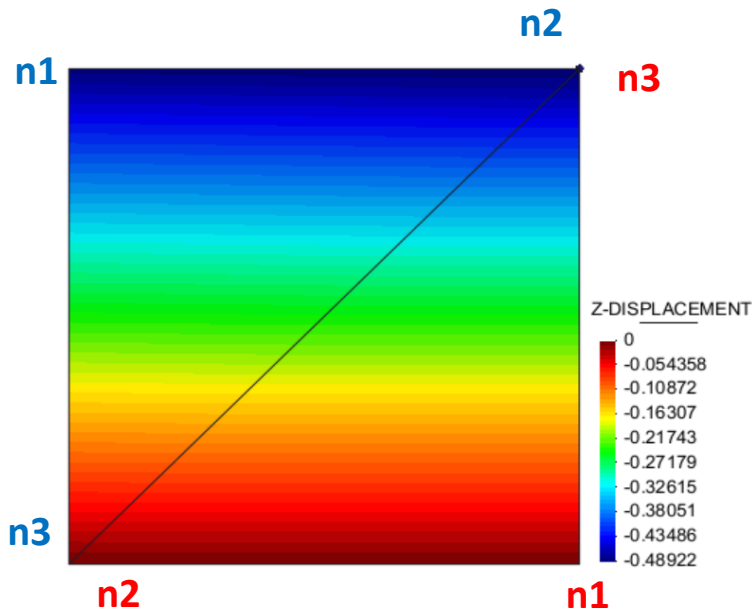
6.94	-3.47	-3.47	-1.74	-1.74	0.00	-1.74	0.00	-1.74
-3.47	6.94	-3.47	1.74	3.47	1.74	0.00	-1.74	-1.74
-3.47	-3.47	6.94	0.00	-1.74	-1.74	1.74	1.74	3.47
-1.74	1.74	0.00	0.87	0.87	0.00	0.00	0.00	0.00
-1.74	3.47	-1.74	0.87	1.74	0.87	0.00	-0.87	-0.87
0.00	1.74	-1.74	0.00	0.87	0.87	0.00	-0.87	-0.87
-1.74	0.00	1.74	0.00	0.00	0.00	0.87	0.00	0.87
0.00	-1.74	1.74	0.00	-0.87	-0.87	0.00	0.87	0.87
-1.74	-1.74	3.47	0.00	-0.87	-0.87	0.87	0.87	1.74

DSGc3 element (with bubble mode)

Element 1: bottom right
Node 1: bottom right
Node 2: bottom left
Node 3: top right
(clockwise ordering)

Element 2: top left
Node 1: top left
Node 2: top right
Node 3: bottom left
(clockwise ordering)

changed so n1 of e2 is at top left corner
and nodal ordering reversed



DSGc3 element 1 shear stiffness matrix

Printing element shear K to Bletzinger Maple DOFs!

6.94	-3.47	-3.47	-1.74	-1.74	0.00	-1.74	0.00	-1.74
-3.47	6.94	-3.47	1.74	3.47	1.74	0.00	-1.74	-1.74
-3.47	-3.47	6.94	0.00	-1.74	-1.74	1.74	1.74	3.47
-1.74	1.74	0.00	0.87	0.87	0.00	0.00	0.00	0.00
-1.74	3.47	-1.74	0.87	1.74	0.87	0.00	-0.87	-0.87
0.00	1.74	-1.74	0.00	0.87	0.87	0.00	-0.87	-0.87
-1.74	0.00	1.74	0.00	0.00	0.00	0.87	0.00	0.87
0.00	-1.74	1.74	0.00	-0.87	-0.87	0.00	0.87	0.87
-1.74	-1.74	3.47	0.00	-0.87	-0.87	0.87	0.87	1.74

DSGc3 element 2 shear stiffness matrix

Printing element shear K to Bletzinger Maple DOFs!

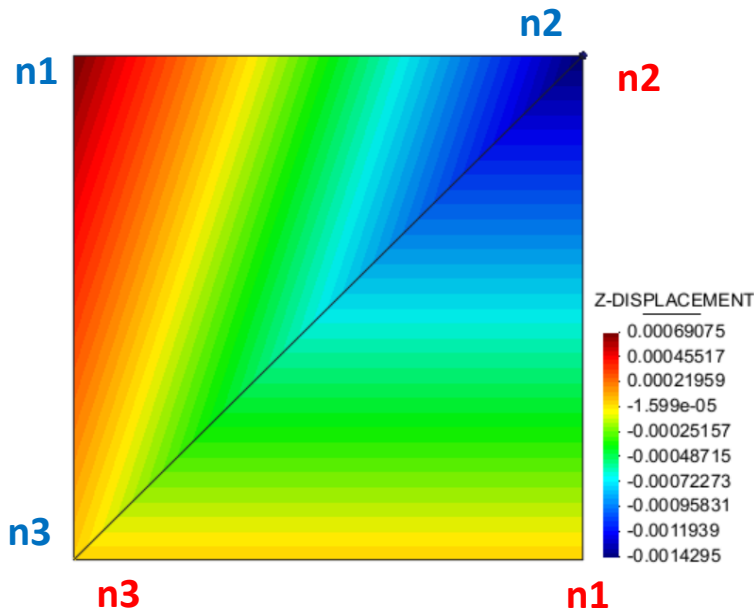
6.94	-3.47	-3.47	-1.74	-1.74	0.00	-1.74	0.00	-1.74
-3.47	6.94	-3.47	1.74	3.47	1.74	0.00	-1.74	-1.74
-3.47	-3.47	6.94	0.00	-1.74	-1.74	1.74	1.74	3.47
-1.74	1.74	0.00	0.87	0.87	0.00	0.00	0.00	0.00
-1.74	3.47	-1.74	0.87	1.74	0.87	0.00	-0.87	-0.87
0.00	1.74	-1.74	0.00	0.87	0.87	0.00	-0.87	-0.87
-1.74	0.00	1.74	0.00	0.00	0.00	0.87	0.00	0.87
0.00	-1.74	1.74	0.00	-0.87	-0.87	0.00	0.87	0.87
-1.74	-1.74	3.47	0.00	-0.87	-0.87	0.87	0.87	1.74

DSGc3 element (with bubble mode)

Element 1: bottom right
Node 1: bottom right
Node 2: top right
Node 3: bottom left
(anticlockwise ordering)

Element 2: top left
Node 1: top left
Node 2: top right
Node 3: bottom left
(clockwise ordering)

*changed so n1 of e2 is at top left corner
and nodal ordering reversed on 1 element
symmetry about the diagonal created*



DSGc3 element 1 shear stiffness matrix

Printing element shear K to Bletzinger Maple DOFs!

6.94	-3.47	-3.47	-1.74	-1.74	0.00	-1.74	0.00	-1.74
-3.47	6.94	-3.47	1.74	3.47	1.74	0.00	-1.74	-1.74
-3.47	-3.47	6.94	0.00	-1.74	-1.74	1.74	1.74	3.47
-1.74	1.74	0.00	0.87	0.87	0.00	0.00	0.00	0.00
-1.74	3.47	-1.74	0.87	1.74	0.87	0.00	-0.87	-0.87
0.00	1.74	-1.74	0.00	0.87	0.87	0.00	-0.87	-0.87
-1.74	0.00	1.74	0.00	0.00	0.00	0.87	0.00	0.87
0.00	-1.74	1.74	0.00	-0.87	-0.87	0.00	0.87	0.87
-1.74	-1.74	3.47	0.00	-0.87	-0.87	0.87	0.87	1.74

DSGc3 element 2 shear stiffness matrix

Printing element shear K to Bletzinger Maple DOFs!

6.94	-3.47	-3.47	-1.74	-1.74	0.00	-1.74	0.00	-1.74
-3.47	6.94	-3.47	1.74	3.47	1.74	0.00	-1.74	-1.74
-3.47	-3.47	6.94	0.00	-1.74	-1.74	1.74	1.74	3.47
-1.74	1.74	0.00	0.87	0.87	0.00	0.00	0.00	0.00
-1.74	3.47	-1.74	0.87	1.74	0.87	0.00	-0.87	-0.87
0.00	1.74	-1.74	0.00	0.87	0.87	0.00	-0.87	-0.87
-1.74	0.00	1.74	0.00	0.00	0.00	0.87	0.00	0.87
0.00	-1.74	1.74	0.00	-0.87	-0.87	0.00	0.87	0.87
-1.74	-1.74	3.47	0.00	-0.87	-0.87	0.87	0.87	1.74

DSGc3 element (with bubble mode)

changed so e1 n2 is at top right

Element 1: bottom right

Node 1: top right

Node 2: bottom left

Node 3: bottom right

(anticlockwise ordering)

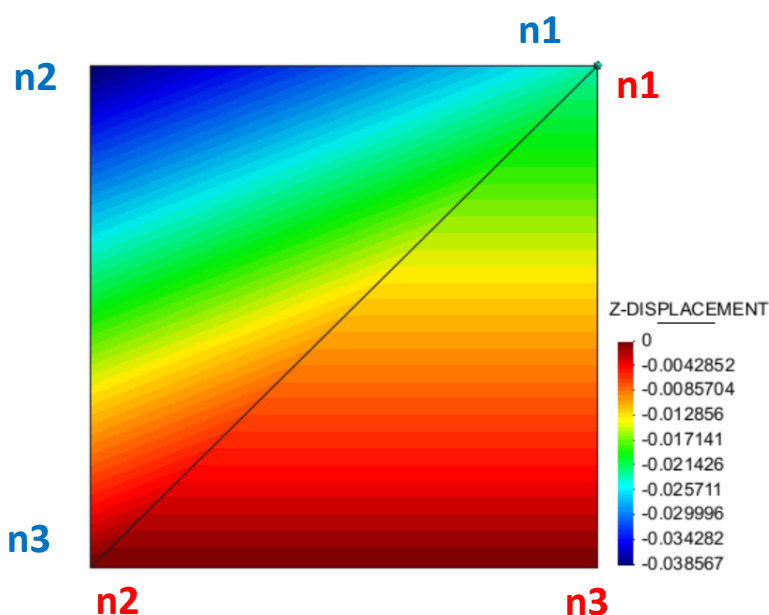
Element 2: top left

Node 1: top right

Node 2: top left

Node 3: bottom left

(anticlockwise ordering)



DSGc3 element 1 shear stiffness matrix

Printing element shear K to Bletzinger Maple DOFs!

10.42	-3.47	-6.94	0.00	-1.74	-1.74	-5.21	1.74	-3.47
-3.47	13.89	-10.42	4.34	6.94	2.60	-2.60	-2.60	-5.21
-6.94	-10.42	17.36	-4.34	-5.21	-0.87	7.81	0.87	8.68
0.00	4.34	-4.34	1.74	2.17	0.43	-1.74	-0.43	-2.17
-1.74	6.94	-5.21	2.17	3.47	1.30	-1.30	-1.30	-2.60
-1.74	2.60	-0.87	0.43	1.30	0.87	0.43	-0.87	-0.43
-5.21	-2.60	7.81	-1.74	-1.30	0.43	4.34	-0.43	3.91
1.74	-2.60	0.87	-0.43	-1.30	-0.87	-0.43	0.87	0.43
-3.47	-5.21	8.68	-2.17	-2.60	-0.43	3.91	0.43	4.34

DSGc3 element 2 shear stiffness matrix

Printing element shear K to Bletzinger Maple DOFs!

10.42	-6.94	-3.47	-1.74	-3.47	-1.74	-3.47	1.74	-1.74
-6.94	17.36	-10.42	6.94	8.68	1.74	-3.47	-1.74	-5.21
-3.47	-10.42	13.89	-5.21	-5.21	0.00	6.94	-0.00	6.94
-1.74	6.94	-5.21	3.47	3.47	0.00	-2.60	0.00	-2.60
-3.47	8.68	-5.21	3.47	4.34	0.87	-1.74	-0.87	-2.60
-1.74	1.74	0.00	0.00	0.87	0.87	0.87	-0.87	0.00
-3.47	-3.47	6.94	-2.60	-1.74	0.87	4.34	-0.87	3.47
1.74	-1.74	-0.00	0.00	-0.87	-0.87	-0.87	0.87	-0.00
-1.74	-5.21	6.94	-2.60	-2.60	0.00	3.47	-0.00	3.47

DSGc3 element (with bubble mode)

Element 1: bottom right

Node 1: top right

Node 2: bottom right

Node 3: bottom left

(clockwise ordering)

Element 2: top left

Node 1: top right

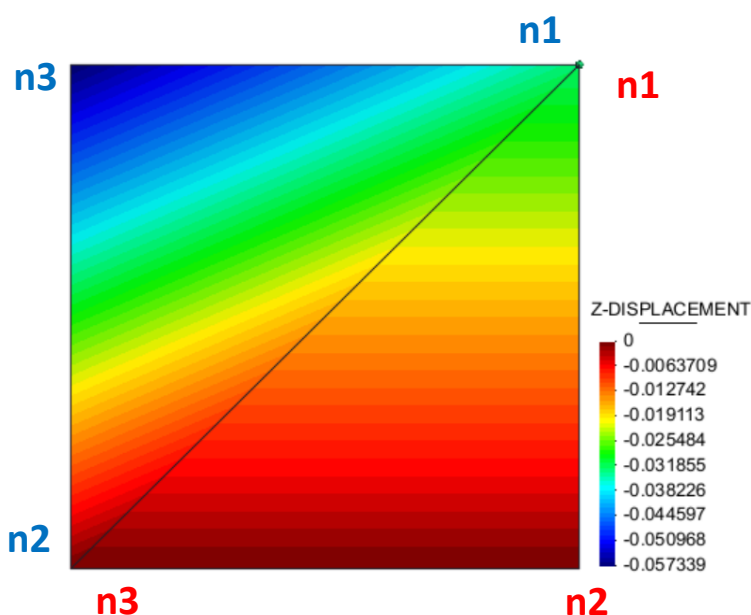
Node 2: bottom left

Node 3: top left

(clockwise ordering)

changed so e1 n2 is at top right

and nodal ordering reversed



DSGc3 element 1 shear stiffness matrix

Printing element shear K to Bletzinger Maple DOFs!

10.42	-6.94	-3.47	-1.74	-3.47	-1.74	-3.47	1.74	-1.74
-6.94	17.36	-10.42	6.94	8.68	1.74	-3.47	-1.74	-5.21
-3.47	-10.42	13.89	-5.21	-5.21	0.00	6.94	-0.00	6.94
-1.74	6.94	-5.21	3.47	3.47	0.00	-2.60	0.00	-2.60
-3.47	8.68	-5.21	3.47	4.34	0.87	-1.74	-0.87	-2.60
-1.74	1.74	0.00	0.00	0.87	0.87	0.87	-0.87	0.00
-3.47	-3.47	6.94	-2.60	-1.74	0.87	4.34	-0.87	3.47
1.74	-1.74	-0.00	0.00	-0.87	-0.87	-0.87	0.87	-0.00
-1.74	-5.21	6.94	-2.60	-2.60	0.00	3.47	-0.00	3.47

DSGc3 element 2 shear stiffness matrix

Printing element shear K to Bletzinger Maple DOFs!

10.42	-3.47	-6.94	0.00	-1.74	-1.74	-5.21	1.74	-3.47
-3.47	13.89	-10.42	4.34	6.94	2.60	-2.60	-2.60	-5.21
-6.94	-10.42	17.36	-4.34	-5.21	-0.87	7.81	0.87	8.68
0.00	4.34	-4.34	1.74	2.17	0.43	-1.74	-0.43	-2.17
-1.74	6.94	-5.21	2.17	3.47	1.30	-1.30	-1.30	-2.60
-1.74	2.60	-0.87	0.43	1.30	0.87	0.43	-0.87	-0.43
-5.21	-2.60	7.81	-1.74	-1.30	0.43	4.34	-0.43	3.91
1.74	-2.60	0.87	-0.43	-1.30	-0.87	-0.43	0.87	0.43
-3.47	-5.21	8.68	-2.17	-2.60	-0.43	3.91	0.43	4.34

DSGc3 element (with bubble mode)

Element 1: bottom right

Node 1: top right

Node 2: bottom left

Node 3: bottom right

(anticlockwise ordering)

Element 2: top left

Node 1: top right

Node 2: bottom left

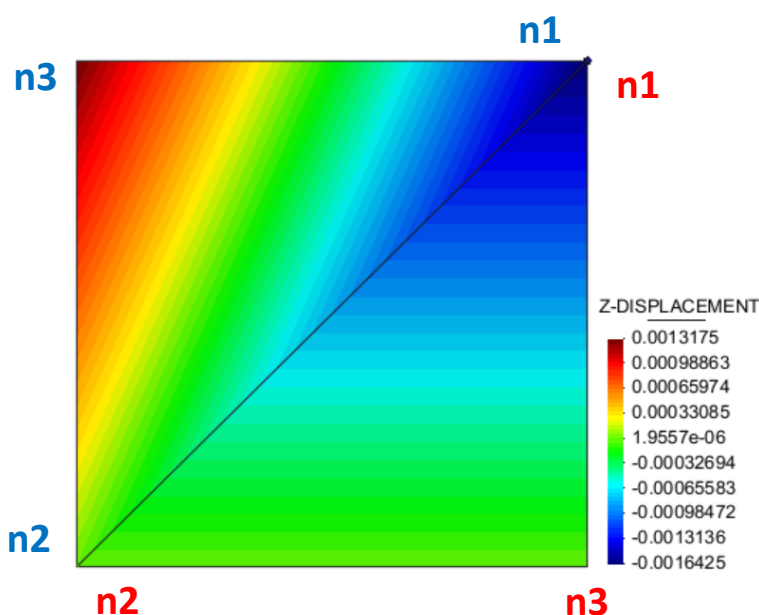
Node 3: top left

(clockwise ordering)

changed so e1 n2 is at top right

and nodal ordering reversed on 1 element

symmetry created about diagonal



DSGc3 element 1 shear stiffness matrix

Printing element shear K to Bletzinger Maple DOFs!

10.42	-3.47	-6.94	0.00	-1.74	-1.74	-5.21	1.74	-3.47
-3.47	13.89	-10.42	4.34	6.94	2.60	-2.60	-2.60	-5.21
-6.94	-10.42	17.36	-4.34	-5.21	-0.87	7.81	0.87	8.68
0.00	4.34	-4.34	1.74	2.17	0.43	-1.74	-0.43	-2.17
-1.74	6.94	-5.21	2.17	3.47	1.30	-1.30	-1.30	-2.60
-1.74	2.60	-0.87	0.43	1.30	0.87	0.43	-0.87	-0.43
-5.21	-2.60	7.81	-1.74	-1.30	0.43	4.34	-0.43	3.91
1.74	-2.60	0.87	-0.43	-1.30	-0.87	-0.43	0.87	0.43
-3.47	-5.21	8.68	-2.17	-2.60	-0.43	3.91	0.43	4.34

DSGc3 element 2 shear stiffness matrix

Printing element shear K to Bletzinger Maple DOFs!

10.42	-3.47	-6.94	0.00	-1.74	-1.74	-5.21	1.74	-3.47
-3.47	13.89	-10.42	4.34	6.94	2.60	-2.60	-2.60	-5.21
-6.94	-10.42	17.36	-4.34	-5.21	-0.87	7.81	0.87	8.68
0.00	4.34	-4.34	1.74	2.17	0.43	-1.74	-0.43	-2.17
-1.74	6.94	-5.21	2.17	3.47	1.30	-1.30	-1.30	-2.60
-1.74	2.60	-0.87	0.43	1.30	0.87	0.43	-0.87	-0.43
-5.21	-2.60	7.81	-1.74	-1.30	0.43	4.34	-0.43	3.91
1.74	-2.60	0.87	-0.43	-1.30	-0.87	-0.43	0.87	0.43
-3.47	-5.21	8.68	-2.17	-2.60	-0.43	3.91	0.43	4.34