

## ZZZZ230 – Placement of the “structural zoom” on a problem 2D

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### Summarized:

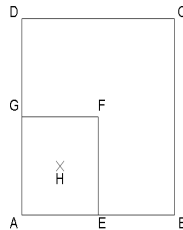
This benchmark makes it possible to test the structural zoom:

- A first model coarsely represents a square with a grid to which one applies a force.
- The second model is a square which represents  $1/4$  first model to which one applies displacements which were calculated with the first model.

One compares then displacements of the two models to test the validity of the “structural zoom”.

## 1 Problem of reference

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### 1.1 Geometry

the square is in space  $[0.,1.] \times [0.,1.]$ .

Coordinates of the points ( $m$ ) :

$$A:(0.,0.) \quad E:(0.5,0.)$$

$$B:(1.,0.) \quad F:(0.5,0.5)$$

$$C:(1.,1.) \quad G:(0.,0.5)$$

$$D:(0.,1.) \quad H:(0.25,0.25)$$

Groups of mesh:

- Surface  $ABCD$
- Surface  $AEFG$
- Segments  $AB$  and  $CD$

### 1.2 Properties of the material

$$E=1.0 \text{ E5 N/m}^2$$

$$\nu=0.3$$

### 1.3 Boundary conditions and loadings

First model  $ABCD$  :

- Imposed displacements:

$$AB : DX = DY = 0$$

- Imposed loadings:

$$CD : FX = 1. \text{E4 N} \text{ and } FY = 2. \text{E4 N}$$

Second model  $AEFG$  (Zoom)

- imposed Displacements:

Displacements obtained with the first model, imposed on edge  $AEFG$  of the second model.

## 2 Reference solution

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### 2.1 Variables reference

the reference variables used are displacements  $DX$  and  $DY$  of the point  $H$ .

The computations carried out on the first model are used as reference for the second model.

### 2.2 Result of reference

Displacements to Point:  $H$

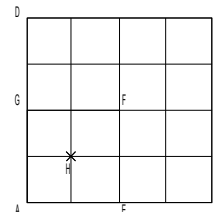
- $DX = 1.116E - 1 m$
- $DY = 8.777E - 2 m$

## 3 Modelization A

### 3.1 Characteristic of the modelization A

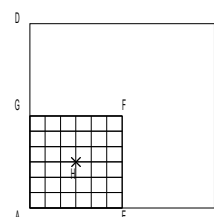
Square  $ABCD$  : Modelization  $D\_PLAN$  :

Many nodes	65		
Number of meshes	32	Are:	
		Square	16
		SEG3	16



QUAD8  $AEFG$  : Modelization  $D\_PLAN$  :

Many nodes	133		
Number of meshes	60	Are:	
		SEG3	24
		QUAD8	36



### 3.2 Results

Not	Quantity	Reference	Tolerance (%)
$H$	$DX$	$1.116 E-1 m$	3.000
	$DY$	$8.777 E-2 m$	3.000

## 4 Summary of the results

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This benchmark shows how to implement a “structural zoom 2D” on a problem. The tolerance of the `TEST_RESU` is in this rather high case because of the mesh carried out coarsely on the first model.