

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

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### Summary:

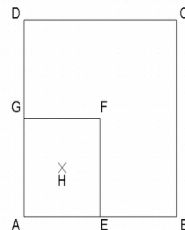
This CAS-test makes it possible to test the structural zoom:

- A first model coarsely represents a square with a grid to which one applies an effort.
- 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 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:  
 $CD$  :  $FX = 1. \text{ E4 N}$  and  $FY = 2. \text{ E4 N}$

Second model  $AEFG$  (Zoom)

- Imposed displacements:  
Displacements obtained with the first model, imposed on the edge  $AEFG$  second model.

## 2 Reference solution

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### 2.1 Reference variables

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

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

### 2.2 Result of reference

Displacements at the Point  $H$  :

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

## 3 Modeling A

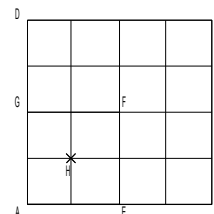
### 3.1 Characteristics of modeling A

- Square  $ABCD$  : Modeling  $D\_PLAN$  :

Many nodes            65  
Many meshes           32            That is to say:

SEG3            16

QUAD8          16

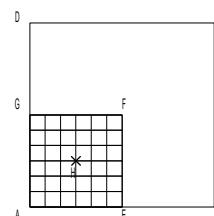


- Square  $A EFG$  : Modeling  $D\_PLAN$  :

Many nodes            133  
Many meshes           60            That is to say:

SEG3            24

QUAD8          36



### 3.2 Results

Not	Size	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 CAS-test shows how to implement a “structural zoom” on a problem 2D. The tolerance of `TEST_RESU` is in this rather high case because of the grid carried out coarsely on the first model.