

ZZZZ205 – Calculation of the kinetic energy of a rectangular plate

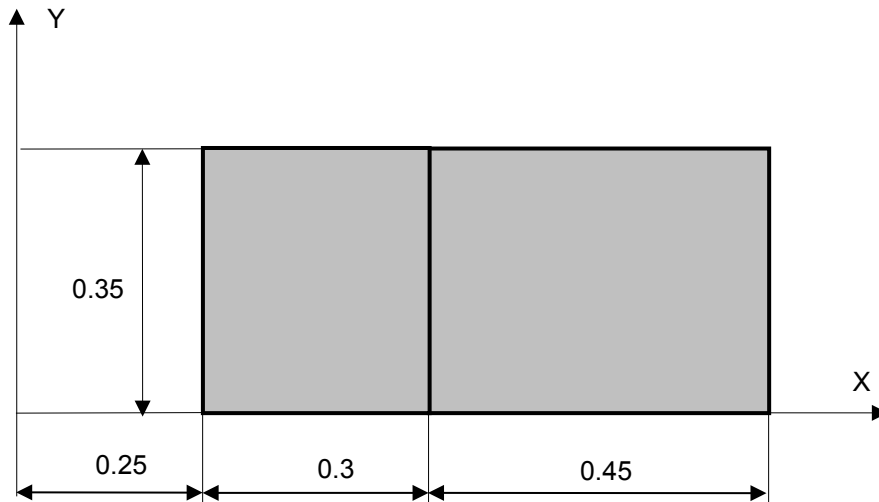
Summary:

This case test is intended to validate the calculation of the kinetic energy for massive modelings 2D.

Only one modeling is carried out made up of meshes QUAD4 and TRIA3.

1 Problem of reference

1.1 Geometry



1.2 Properties of material

- Steel
 - $E = 2 \times 10^{11} \text{ MPa}$
 - $\nu = 0.3$
 - $\rho = 7800 \text{ kg/m}^3$

1.3 Boundary conditions

Calculation of the kinetic energy starting from speed $E_c = \frac{1}{2} V^T M V$:

- A uniform speed is imposed:
 - with $t = 1\text{s}$: according to X of 1.5 m/s
 - with $t = 2\text{s}$: according to X of 1.5 m/s and following Y of 2.5 m/s

1.4 Initial conditions

None.

2 Reference solution

2.1 Method of calculating

The solution is analytical. The kinetic energy is deduced speed:

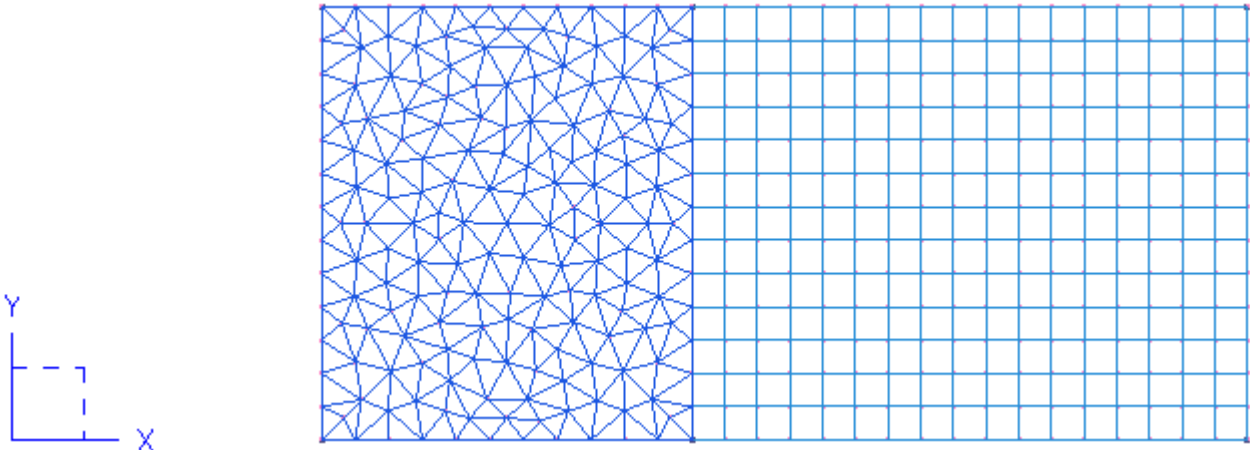
$$E_c = \frac{1}{2} V^T M V$$

2.2 Sizes and results of reference

Sizes	Values	Unit
Mass	2.0475 10 ³	kg
$E_c(t=1s)$	2.3034375 10 ³	W
$E_c(t=2s)$	8.70187 10 ³	W

3 Modeling A

3.1 Characteristics of modeling



3.2 Characteristics of the grid

Many meshes: 541 (320 TRIA3, 221 QUAD4)
Many nodes: 423

3.3 Sizes tested and results

Identification	Size	Reference
<i>Mass</i>	<i>TOTALE</i>	2.047510 ³
<i>Kinetic energy</i> (<i>t=1</i>)	<i>TOTALE</i>	2.30344 10 ³
<i>Kinetic energy</i> (<i>t=2</i>)	<i>TOTALE</i>	8.70187 10 ³

4 Summary of the results

This test makes it possible to validate the calculation of the kinetic energy for modeling D_PLAN.