

ZZZZ205 – Computation of the kinetic energy of a rectangular plate

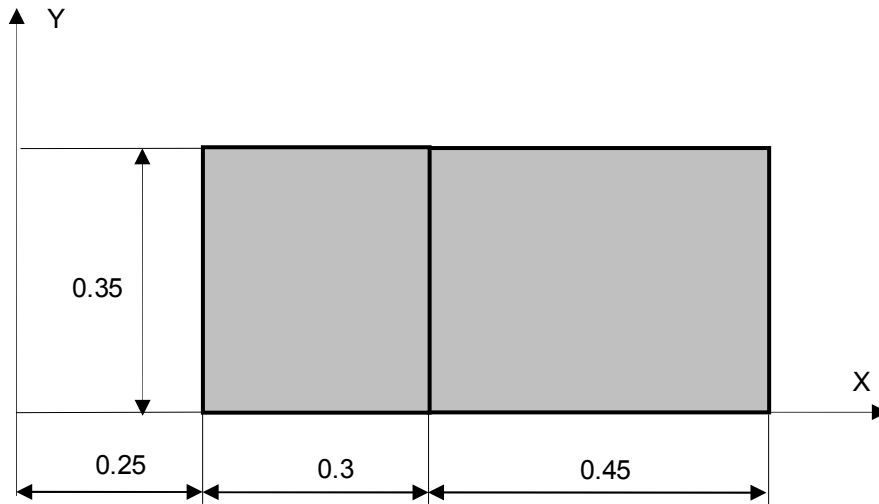
Abstract:

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

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

1 Problem of reference

1.1 Geometry



1.2 Properties of the material

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

1.3 Boundary conditions

Computation of kinetic energy from the velocity $E_c = \frac{1}{2} V^T M V$:

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

1.4 Initial conditions

None.

2 Reference solution

2.1 Method of calculating

the solution is analytical. Kinetic energy is deduced the velocity:

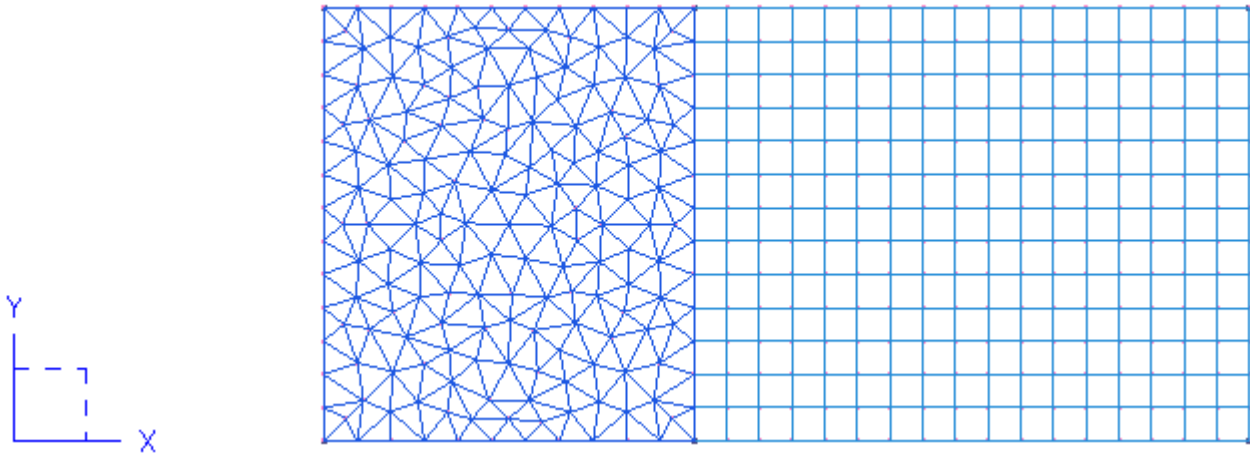
$$E_c = \frac{1}{2} V^T M V$$

2.2 Quantities and results of reference

Quantities	Values	Unit
Masses	2.0475 103	kg
$E_c(t=1s)$	2.3034375 103	W
$E_c(t=2s)$	8.70187 103	W

3 Modelization A

3.1 Characteristic of the modelization



3.2 Characteristics of the mesh

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

3.3 Quantities tested and results

Identification	Quantity	Reference
<i>Masses</i>	<i>TOTALE</i>	2.0475103
<i>Kinetic energy</i> (<i>t=1</i>)	<i>TOTALE</i>	2.30344 103
<i>Kinetic energy</i> (<i>t=2</i>)	<i>TOTALE</i>	8.70187 103

4 Summary of the results

This test makes it possible to validate the computation of kinetic energy for modelization D_PLAN.