

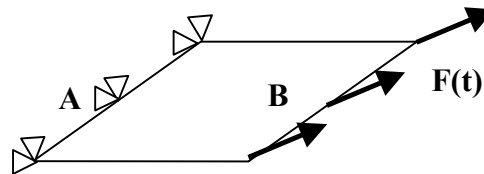
SDLS116 – Plate in transitory loading, treated in explicit dynamics

Summary:

This test validates modeling `DKT` for a transitory calculation with a diagram clarifies digital integration by the operator `DYNA_NON_LINE` and with the matrix of diagonalized mass (`MASS_MECA_DIAG`). The square plate is requested by a force linear on one on the sides and linear in time. The results are compared with those obtained by the software *EUROPLEXUS*.

1 Problem of reference

1.1 Geometry



Square plate :
Length: $l = 1.0 \text{ m}$
Thickness: $e = 0.1 \text{ m}$

1.2 Properties of material

Young modulus, $E = 4.388 \cdot 10^{10} \text{ N/m}^2$

Poisson's ratio, $\nu = 0.0$

Density, $\rho = 2500 \text{ kg/m}^3$

1.3 Boundary conditions and loadings

On with dimensions one A one embeds displacements in x and z , $u_x = u_z = 0.0$, as well as rotations, $u_{Rx} = u_{Ry} = u_{Rz} = 0.0$. Then, one applies the linear force to with dimensions one B in the direction $(1.0, 0.0, 1.0)$, linear in time:

$$F(t) = F_0 \cdot t$$

where F_0 is the amplitude, $F_0 = 1.6166 \cdot 10^5 \text{ N}$.

1.4 Initial conditions

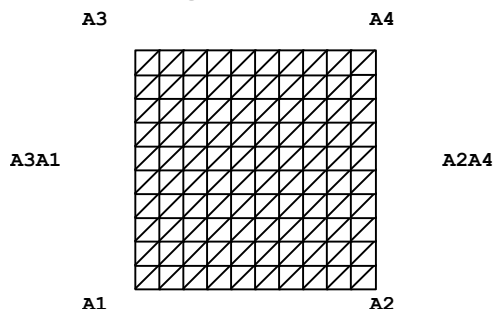
At the beginning displacements and speeds are worth zero everywhere.

2 Reference solution

The reference solution is obtained by the software *EUROPLEXUS* (see the corresponding command file, *.epx*).

3 Modeling A

3.1 Characteristics of modeling



Modeling: **DKT**

Boundary conditions:

With - DDL_IMPO= (_F (GROUP_NO=' A3A1', DX=0.0, DZ=0.0, DRX=0.0, DRY=0.0, DRZ=0.0,) ,

_ F (GROUP_NO=' A1', DX=0.0, DY=0.0, DZ=0.0, DRX=0.0, DRY=0.0 DRZ=0.0,) ,)

B - FORCE_ARETE = _F (GROUP_MA = ' A2A4', FX=1.0, FZ=1.0)

3.2 Characteristics of the grid

Nodes: 121

Meshes: 200 TRIA3

3.3 Sizes tested and results

Identification	Type of reference	Value of reference	Tolerance
Displacement DZ in $N2$ at the moment $1,2E-3s$	'SOURCE_EXTERNE' (EUROPLEXUS)	0.0117509	1, E-6
Number of revolutions DRX in $N2$	'SOURCE_EXTERNE' (EUROPLEXUS)	4.5782600000000002	1, E-6
Constraints at the points of Gauss at the moment $1.2E-3$: $SIXZ$ in MI at the point 1 under point 2	'NON_REGRESSION'	28317132.8214	1, E-6
Constraints at the points of Gauss at the moment $1.2E-3$: $SIYZ$ in MI at the point 1 under point 2	'NON_REGRESSION'	4247900.92854	1, E-6

4 Summary of the results

This test compares the results of an analysis of fast dynamics (with the operator `DYNA_NON_LINE`) with those obtained with the software *EUROPLEXUS*. The variation which can nevertheless reach 1% on a very simple example (few degrees of freedom and linear behavior), the test highlights also a difference of the treatment for the two codes.