

PERF012 – Performances of elementary calculations in 3D

Summary:

The objective of this CAS-test is to measure the performances of elementary calculations 3D for a non-linear behavior "simple" (VMIS_ISOT_TRAC).

The grid contains 6400 HEXA8.

The order carried out is DYNA_NON_LINE for 400 pas de time. There is only one factorization of the matrix. Time is primarily spent in elementary calculations and assemblies of the second member.

One can compare the execution time with that obtained by Europlexus.

There is only one modeling (A) corresponding to a sequential calculation.

1 Problem of reference

1.1 Geometry

The problem is that of a square plate 1×1 directed according to Ox and Oy .
Its thickness is of 0.1 according to Oz .

The face $x=0$ is FAC1

The face $x=1$ is FAC2.

1.2 Properties of material

$E=2.1e11$	Young modulus,
$\nu=0.3$	Poisson's ratio,
$RHO=7800.$	Density,
Traction diagram	$7.14286e4, 1.5e8$
(VMIS_ISOT_TRAC)	$1.00143, 3.0e8$

1.3 Boundary conditions and loadings

Imposed displacement:

On the face FAC1 : $DX=0$

Moreover, one blocks degrees of freedom of 2 points of FAC1 to avoid any movement of rigid body.

A pressure is imposed $P=2.e6$ on the face FAC2 (opposed to FAC1). The plate is compressed.

1.4 Discretization in time

The initial state is the rest. One calculates the solution until $t_f=75.e-6s$ in 400 pas de time of $0.1875e-6s$ each one.

2 Reference solution

2.1 Method of calculating

The results of reference were got with the Europlexus code.

Displacement according to Ox of 2 points of FAC2 is printed in the course of time. At the end of simulation (t_f), the displacement of these 2 points is worth $-3.931011e-6$.

2.2 Uncertainties

The object of the test is not to validate `DYNA_NON_LINE`, but to measure the performances of Aster (in comparison with those of Europlexus). One simply seeks to carry out same dynamic calculation with the 2 codes.

The solutions Aster and Europlexus differ from less than 0.02% what shows that with the problem dealt by the two codes is well the same one.

3 Modeling A

3.1 Characteristics of modeling A

Number of processor: 1

Modeling 3D : 6400 HEXA8

DYNA_NON_LINE : 400 pas de time

3.2 Results

Size	Reference	Tolerance (%)
DEPL DX Point A2	-3.931011e-6	0.02
DEPL DX Point A4	-3.931011e-6	0.02

4 Summary of the results

Machine	Version	Memory (Mo)		Number DDL	Time execution (DYNA_NON_LINE) (dryness)			
		Allocat ed	Used		TO USE	SYSTEM	TO USE +SYS	ELAPSED
Linux 64 bits "aster4"	10.04	200	187	25215	115.05	0.19	115.24	115.35