

PLEXU01 – Elementary validation of the order CALC_EUROPLEXUS

Summary:

The objective of this test is to validate the order `CALC_EUROPLEXUS` who launches a calculation `EUROPLEXUS` (fast code of dynamics) starting from a setting in data of calculation in Code_Aster. It is checked that the results recovered by Code_Aster following calculation `EUROPLEXUS` are well those calculated by `EUROPLEXUS` alone.

1 Problem of reference

1.1 Geometry

One considers a structure models made up of a horizontal square flagstone 0.5 m of thickness and of 3 m of with dimensions, four vertical posts length 3 m planted in four corners of the flagstone and four horizontal beams (of the same length) connecting between them the high ends of the posts and thus constituting a closed contour. All the posts and beams have a rectangular section $0.4\text{ m} \times 0.6\text{ m}$.

1.2 Properties of material

The material of the flagstone is elastic isotropic corresponding to a concrete whose properties are:

- $E = 30\,000\text{ MPa}$
- $\nu = 0.3$
- $\rho = 2500\text{ kg/m}^3$

The material of the posts and beams is elastic isotropic corresponding to a steel whose properties are:

- $E = 200\,000\text{ MPa}$
- $\nu = 0.3$
- $\rho = 7500\text{ kg/m}^3$

1.3 Boundary conditions and loadings

The flagstone is pressed on a carpet of springs whose stiffness is calculated by the order `RIGI_PARASOL` starting from 6 specified values. A carpet of shock absorbers of ground is also defined, of type `A_T_D_N`, of which the values are selected voluntarily low in order to remain close to the reference solution, calculated, it, by neglecting this damping.

The flagstone is charged by a surface pressure whose pace in time is given by a function.

1.4 Initial conditions

Nothing.

2 Reference solution

2.1 Method of calculating

The reference solution comes from the calculation EUROPLEXUS launched apart from Code_Aster.

2.2 Sizes and results of reference

One tests at the final moment the values of displacement, speed and of acceleration read again by Code_Aster and one compares them with the values resulting from a calculation EUROPLEXUS alone.

2.3 Uncertainties on the solution

Nothing.

3 Modeling A

3.1 Characteristics of modeling

A modeling is used Q4GG pour the flagstone and POU_D_E for the beams and posts.

3.2 Characteristics of the grid

The grid of the flagstone contains 36 elements of the type QUAD4. Each beam and post are discretized with 6 meshes SEG2.

3.3 Sizes tested and results

One tests at the final moment the values of displacement, speed and of acceleration read again by Code_Aster and one compares them with the values resulting from a calculation EUROPLEXUS alone.

Identification	Type of reference	Value of reference	Tolerance
Not NI - DZ	'NON_REGRESSION'	5.56E-03	0,011%
Not N49 - VRZ	'NON_REGRESSION'	-1.718E-04	0,016%
Not NI - ARX	'NON_REGRESSION'	5.56E-03	0.0004%