PYNL01 - Integration of behavior VMIS_ISOT_LINE by the command CALCUL

Summarized:

The purpose of this document is CALCUL validating the command for the integration of constitutive law.

1 Problem of reference

1.1 Geometry

One considers a unit cube length ($1\mathrm{m}$).

1.2 Properties of the material

One considers a material with a constitutive law of Von Mises with linear isotropic hardening (VMIS_ISOT_LINE).
The elastic properties are the following ones:
- Young modulus: $E=210\,000\,MPa$
- Poisson's ratio: $\nu=0,3$

The tangent modulus is worth: $E_t=1930\,MPa$.
The elastic limit is worth: $\sigma_y=181\,MPa$.

1.3 Boundary conditions and loadings

the lower face (in the plane $z=0$) is clamped.

The upper face (in the plane $z=1$) is subjected to a displacement $du=\begin{pmatrix}1\\1\\1\end{pmatrix}[m]$.

2 Reference solution

the reference solution is obtained by a numerical resolution of the problem (elastic prediction then integration of the behavior) using command STAT_NON_LINE. One thus obtains the stress field, the field of nodal local variables and the force vector following the prediction.

3 Modelization A

3.1 Characteristic of the modelization

In this modelization, one replaces command STAT_NON_LINE by splitted commands, which carry out the elastic prediction then the integration of the behavior.

3.2 Characteristics of the mesh

The mesh is composed of only one mesh HEXA8.

3.3 Quantities tested and results

One tests the difference between the stress field (respectively the field of local variables and the vector of the nodal forces) calculated by STAT_NON_LINE and that calculated by the command CALCUL, after the prediction.

Identification	Reference	% difference
$min(\Delta\sigma)$	0	0
$max(\Delta\sigma)$	0	0
$min(\Delta vi)$	0	0
$max(\Delta vi)$	0	0
$min(\Delta f)$	0	0
$max(\Delta f)$	0	0

4 Summary of the results

This test made it possible to CALCUL validate the command for the integration of the constitutive law of Von Mises with linear isotropic hardening.