PYNL01 - Integration of the behavior 
VMIS_ISOT_LINE by the order CALCULATION

Summary:

The purpose of this document is to validate the order CALCULATION for the integration of law of behavior.
1 Problem of reference

1.1 Geometry

One considers a unit cube length (1 m).

1.2 Properties of material

One considers a material with a law of behavior of Von Mises with linear isotropic work hardening (VMIS ISOT LINE).

The elastic properties are the following ones:

- Young modulus: $E = 210,000 \text{ MPa}$
- Poisson’s ratio: $\nu = 0.3$

The tangent module is worth: $E_t = 1930 \text{ MPa}$.

The elastic limit is worth: $\sigma_y = 181 \text{ MPa}$.

1.3 Boundary conditions and loadings

The lower face (in the plan $z = 0$) is embedded.

The higher face (in the plan $z = 1$) is subjected to a displacement $du = \begin{bmatrix} 1 \\ 1 \end{bmatrix} \text{[m]}$.

2 Reference solution

The reference solution is obtained by a digital resolution of the problem (elastic prediction then integration of the behavior) using the order STAT_NON_LINE. One thus obtains the stress field, the field of internal variables and the vector of nodal forces following the prediction.
3 Modeling A

3.1 Characteristics of modeling

In this modeling, the order is replaced `STAT_NON_LINE` by burst orders, which carry out the elastic prediction then the integration of the behavior.

3.2 Characteristics of the grid

The grid is composed of only one nets `HEXA8`.

3.3 Sizes tested and results

One tests the difference between the stress field (respectively the field of internal variables and the vector of the nodal forces) calculated by `STAT_NON_LINE` and that calculated by the order `CALCULATION`, after the prediction.

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Summary of the results

This test made it possible to validate the order CALCULATION for the integration of the law of behavior of Von Mises with linear isotropic work hardening.