

ZZZZ414 - Verification of the law of HUJEUX on a material point

Summary:

This test check the use of the law of Hujeux on a material point.

Modeling a: simulation on a material point of a way of loading ruining the local iterations of Newton and activating a heuristic mechanism of revival of the resolution.

1 Problem of reference

1.1 Description

This CAS-test is resulting from the card 26795 faisANT state of a brutal stop in the law of Hujoux because of an error of segmentation in a study of construction by layers of a stopping in fill. It reproduces on a material point the way of loading at the origin of planting. This way of loading led to the failure Dbe iterations of Newton local and activE a heuristic mechanism of revival of the resolution.

1.2 Properties of materials

1.2.1 Elastic properties of material

The material is of the type of a dense sand. The elastic properties are:

- module of Young : $E = 2029431300.40069 Pa$
- Poisson's ratio : $\nu = 0.45$

The unelastic properties (Hujoux) are:

- power of the non-linear elastic law: $n_e = 0$
- $\beta = 200$
- $d = 3.5$
- $b = 0.6$
- angle of friction: $\phi = 40^\circ$
- angle of dilatancy: $\psi = 30^\circ$
- critical pressure: $P_{c0} = -2,24 MPa$
- pressure of reference: $P_{ref} = -1 MPa$
- elastic ray of the isotropic mechanism: $r_{\text{éla}}^s = 0.01$
- elastic ray of the mechanism déviatoire: $r_{\text{éla}}^d = 0.01$
- $a_{mon} = 0.03$
- $a_{cyc} = 0.00001$
- $c_{mon} = 0.0003$
- $c_{cyc} = 0.0003$
- $r_{hys} = 0.1$
- $r_{mob} = 0.9$
- $x_m = 2$
- $dila = 1$

1.3 Conditions initialbe and mechanical loading

1.3.1 Condition initialbe

Conditions initial in deformations are the following ones:

- $EPXX0 = -1.350354802792579E-021$
- $EPYY0 = -3.980032078861482E-007$
- $EPZZ0 = 0$
- $EPXY0 = \frac{8.492341581286122E-008}{\sqrt{2}}$
- $EPXZ0 = 0$

- $EPYZ = 0$

Conditions initial in constraints are the following ones:

- $SIXX = -125 \text{ kPa}$
- $SIYY = -125 \text{ kPa}$
- $SIZZ = -125 \text{ kPa}$
- $SIXY = 0$
- $SIXZ = 0$
- $SIYZ = 0$

Internal variables initial are worthless.

1.3.2 Loading

The increment of deformation applied is it according to:

- $\Delta EPXX = 7.372770706199615E-006$
- $\Delta EPYY = 4.632919275111915E-005$
- $\Delta EPZZ = 0$
- $\Delta EPXY = \frac{1.733367998412452E-006}{\sqrt{2}}$
- $\Delta EPXZ = 0$
- $\Delta EPYZ = 0$

2 Reference solution

A test of nonregression is considered.

3 Modeling A

3.1 Characteristics of modeling

Modeling With is realized with the macro-order SIMU_POINT_MAT. The algorithmic parameters of the law of Hujeux are:

- ITER_INTE_MAXI = 10
- RESI_INTE_RELA = 1.E-7
- ALGO_INTE = 'SPECIFIC'
- ITER_INTE_PAS = -10

3.2 Sizes tested and results

Identification	Type of reference	Value of reference	Tolerance
SIXX	'NON_REGRESSION'	-2	0.0001%
SIYY	'NON_REGRESSION'	-2	0.0001%
SIZZ	'NON_REGRESSION'	-2	0.0001%
V23	'NON_REGRESSION'	8.05131752866E-6	0.0001%

Table 3.2-1

4 Summary of the results

This data-processing CAS-test makes it possible to validate the good performance of the heuristic mechanism established in the law of Hujeux in the event of failure of the local iterations of Newton.