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 Hujeux 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 (Hujeux) 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: $r_{\text{ela}} = 0.01$
- elastic ray of the mechanism déviatoire: $r_{\text{ela}}^d = 0.01$
- $a_{\text{mon}} = 0.03$
- $a_{\text{cyc}} = 0.00001$
- $c_{\text{mon}} = 0.0003$
- $c_{\text{cyc}} = 0.0003$
- $r_{\text{hy}} = 0.1$
- $r_{\text{mob}} = 0.9$
- $x_m = 2$
- $dila = 1$

1.3 Conditions initialbe and mechanical loading

1.3.1 Condition initialbe

Conditions initial in deformations are the following ones:
- $EPXX \, 0 = -1.350354802792579E-021$
- $EPYY \, 0 = -3.980032078861482E-007$
- $EPZZ \, 0 =$
- $EPXY \, 0 = \frac{8.492341581286122E-008}{\sqrt{2}}$
- $EPXZ \, 0 =$
• \( EY_{Z0} = 0 \)

Conditions initial in constraints are the following ones:
• \( S_{XX} 0 = -125 \text{kPa} \)
• \( S_{YY} 0 = -125 \text{kPa} \)
• \( S_{ZZ} 0 = -125 \text{kPa} \)
• \( S_{XY} 0 = 0 \)
• \( S_{XZ} 0 = 0 \)
• \( S_{YZ} 0 = 0 \)

Internal variables initial are worthless.

1.3.2 Loading

The increment of deformation applied is it according to:
• \( \Delta E_{PXX} = 7.372770706199615 \times 10^{-6} \)
• \( \Delta E_{PYY} = 4.632919275111915 \times 10^{-5} \)
• \( \Delta E_{PZZ} = 0 \)
• \( \Delta E_{PXZ} = 0 \)
• \( \Delta E_{PYZ} = 0 \)
• \( \Delta E_{PXY} = \frac{1.733367998412452 \times 10^{-6}}{\sqrt{2}} \)
2 Reference solution

A test of nonregression is considered.
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

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<th>Tolerance</th>
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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.