Norton behaviour description

- file : Norton.mfront
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This viscoplastic behaviour is fully determined by the evolution of the equivalent viscoplastic strain p as a function f of the Von Mises stress σ_{eq} :

$$\dot{p} = f\left(\sigma_{\mathrm{eq}}\right) = A\,\sigma_{\mathrm{eq}}^{E}$$

where :

- A is the Norton coefficient .
- E is the Norton exponent .

A and E are declared as material properties .

List of supported Hypotheses

- AxisymmetricalGeneralisedPlaneStrain
- Axisymmetrical
- PlaneStrain
- GeneralisedPlaneStrain
- Tridimensional

Variables

Material properties

- YoungModulus:
  - variable name: young
  - variable type: stress
  - description: the Young modulus of an isotropic material
- PoissonRatio:
  - variable name: nu
  - variable type: real
  - description: the Poisson ratio of an isotropic material
- NortonCoefficient:
  - variable name: A

  - variable type: real
  - description: The Norton coefficient
- NortonExponent:
  - variable name: E
  - variable type: real
  - description: The Norton coefficient

State variables

- ElasticStrain:
  - variable name: eel
  - variable type: StrainStensor
  - description: la déformation élastique
- EquivalentViscoplasticStrain:
  - variable name: p
  - variable type: strain
  - description: la déformation viscoplastique équivalente

Parameters

- theta:
  - variable type: real
  - default value: 0.5
- epsilon:
  - variable type: real
  - default value: 1e-08
- iterMax:
  - variable type: ushort
  - default value: 100

Local variables

- lambda:
  - variable type: stress
- mu:
  - variable type: stress

- T_:
  - variable type: temperature
- f:
  - variable type: DstrainDt
- df_dseq:
  - variable type: DF_DSEQ_TYPE
- se:
  - variable type: StressStensor
- seq:
  - variable type: stress
- seq_e:
  - variable type: stress
- n:
  - variable type: StrainStensor

Code documentation

FlowRule description

The return-mapping algorithm used to integrate this behaviour requires the definition of f and $\dfrac{\partial f}{\partial \sigma_{\text{eq}}}$ (see Simo and Hughes (1998) and Helfer et al. (2013) for details).

We introduce an auxiliary variable called `tmp` to limit the number of call to the `pow` function

Helfer, Thomas, Étienne Castelier, Victor Blanc, and Jérôme Julien. 2013. *Le Générateur de Code Mfront : Écriture de Lois de Comportement Mécanique*. Note technique 13-020. CEA DEN/DEC/SESC/LSC.

Simo, Juan C, and Thomas J. R Hughes. 1998. *Computational Inelasticity*. New York: Springer.