# Norton behaviour description

* file : Norton.mfront
* author : Helfer Thomas
* date : 23 / 11 / 06

This viscoplastic behaviour is fully determined by the evolution of the equivalent viscoplastic strain $p$ as a function $f$ of the Von Mises stress $σ\_{eq}$ :

$$\dot{p}=f\left(σ\_{eq}\right)=A σ\_{eq}^{E}$$

where :

* $A$ is the Norton coefficient .
* $E$ is the Norton exponent .

$A$ and $E$ are declared as material properties .

## Source code

@Parser IsotropicMisesCreep;
@Behaviour Norton;
@Author Helfer Thomas;
@Date 23/11/06;
@Description{
 This viscoplastic behaviour is fully determined by the evolution
 of the equivalent viscoplastic strain "\(p\)" as a function "\(f\)"
 of the Von Mises stress "\(\sigmaeq\)":
 "\["
 "\dot{p}=f\paren{\sigmaeq}=A\,\sigmaeq^{E}"
 "\]"
 where:

 - "\(A\)" is the Norton coefficient.
 - "\(E\)" is the Norton exponent.

 "\(A\)" and "\(E\)" are declared as material properties.
}

@UMATFiniteStrainStrategies[umat] {None,LogarithmicStrain1D};

//! The Norton coefficient
@MaterialProperty real A;
A.setEntryName("NortonCoefficient");

//! The Norton coefficient
@MaterialProperty real E;
E.setEntryName("NortonExponent");

@FlowRule{
 /\*!
 \* The return-mapping algorithm used to integrate this behaviour
 \* requires the definition of \(f\) and \(\deriv{f}{\sigmaeq}\) (see
 \* @simo\_computational\_1998 and @helfer\_generateur\_2013 for
 \* details).
 \*
 \* We introduce an auxiliary variable called `tmp` to
 \* limit the number of call to the `pow` function
 \*/
 const real tmp = A\*pow(seq,E-1);
 f = tmp\*seq;
 df\_dseq = E\*tmp;
}