# 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 as a function of the Von Mises stress :

where :

* is the Norton coefficient .
* is the Norton exponent .

and 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;  
}