

## SSNA110 - Retiming of parameters with the model VISC\_CIN2\_CHAB

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### Summary:

This test of nonlinear quasi-static mechanics makes it possible to validate the retiming of parameters for the model `VISC_CIN2_CHAB` in `2D` in the case of an axisymmetric test-tube (homogeneous stress and strain state) subjected to a simple tensile test.

Four traction diagrams are used as reference (at different speeds of deformation). The curves of reference result from tests on steel `10CD9-10` with  $545^{\circ}C$ .

One identifies simultaneously the 11 viscoplastic parameters of the model.  
The modeling of the test-tube is carried out with an element `2D` (`QUA4`).

## 1 Problem of reference

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### 1.1 Geometry

The geometry is selected voluntarily simple, to translate a stress and strain state homogeneous, as it is the case in uniaxial traction. It is here about an element of volume represented by a square on side 0.01mm . Modeling is axisymmetric, and traction is done with imposed deformation.

### 1.2 Properties of material

The fixed characteristics are the following ones:

Keyword ELAS :

YOUNG = 143006.0 MPa

NAKED = 0.33

UN\_SUR\_M= 0

G2\_0= 0.28

The parameters to be identified have for initial values and terminals:

Keyword	CIN2_CHAB	Initial value	Limit inf	Limit sup
	R0	100	0.01	1000
	R_I	120	0.01	2000
	B	0.0934	0.01	20
	K	4,307	0.01	20
	W	0,156	0.01	20
	G1_0	245	0.01	2000
	C1_I	2628	0.01	20000
	C2_I	105	0.01	2000000
	A_I	1.24	0.01	2000
Keyword	LEMAITRE			
	UN_SUR_K	0,003	0.00001	2000
	EXP_N	15	0.01	2000

### 1.3 Boundary conditions and loadings

$DY=0$  on the lower side

$DX=0$  on the left side

$DY$  imposed on the top, such as:

$$DY(t) = (EPS_{final} * H) / tmax * t$$

With  $EPS_{final} = 0.01$

$H = 0.01 \text{ mm}$

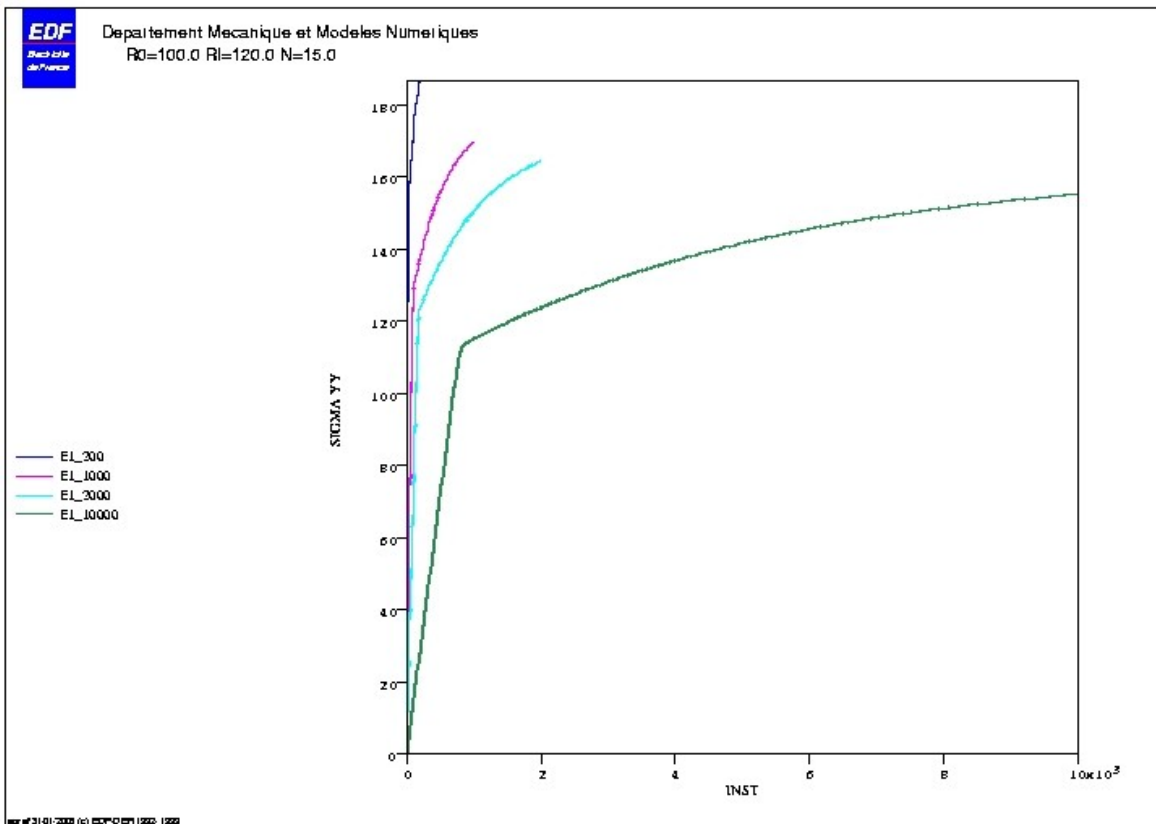
$Tmax = 200s, 1000s, 2000s, 10000s$

This corresponds to the speeds of deformation imposed of  $5 \cdot 10^{-4} / s, 1 \cdot 10^{-3} / s, 5 \cdot 10^{-3} / s, 1 \cdot 10^{-6} / s$  .

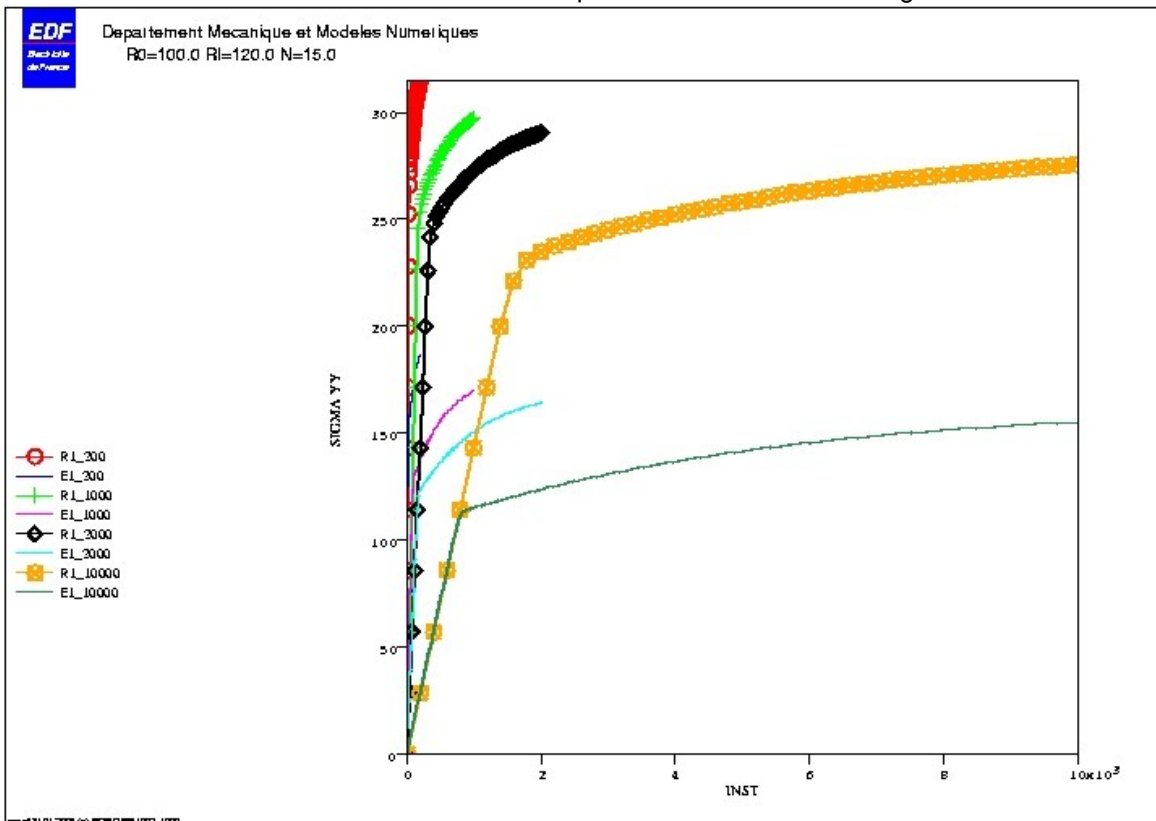
## 1.4 Initial conditions

Worthless constraints and deformations.

## 1.5 Curves of reference



The curves obtained with the initial values of the parameters are the following ones:



## 2 Reference solution

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### 2.1 Method of calculating

Solution of nonregression: values of the parameters

### 2.2 Sizes and results of reference

Values of the parameters identified for 50 increments on each curve:

<b>Keyword</b>	<b>CIN2_CHAB</b>	<b>Identified value</b>
	R0	5.3955
	R_I	124.5167
	B	0.0936
	K	10.1492
	W	0.1524
	G1_0	530.2700
	C1_I	1065.5520
	C2_I	276.1403
	A_I	1.2069
<b>Keyword</b>	<b>LEMAITRE</b>	
	UN_SUR_K	0.003643
	EXP_N	14.5181

### 2.3 Uncertainties on the solution

Without object

## 3 Modeling A

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### 3.1 Characteristics of modeling

One uses 50 increments of identical sizes to calculate the various time intervals (0,10000s), (0s,200s), (0s,2000s), and (0s,1000s). This for reasons of time CPU. (2200s with 50 increments). The results are thus far away from the reference, and the provided values are values of nonregression.

### 3.2 Characteristics of the grid

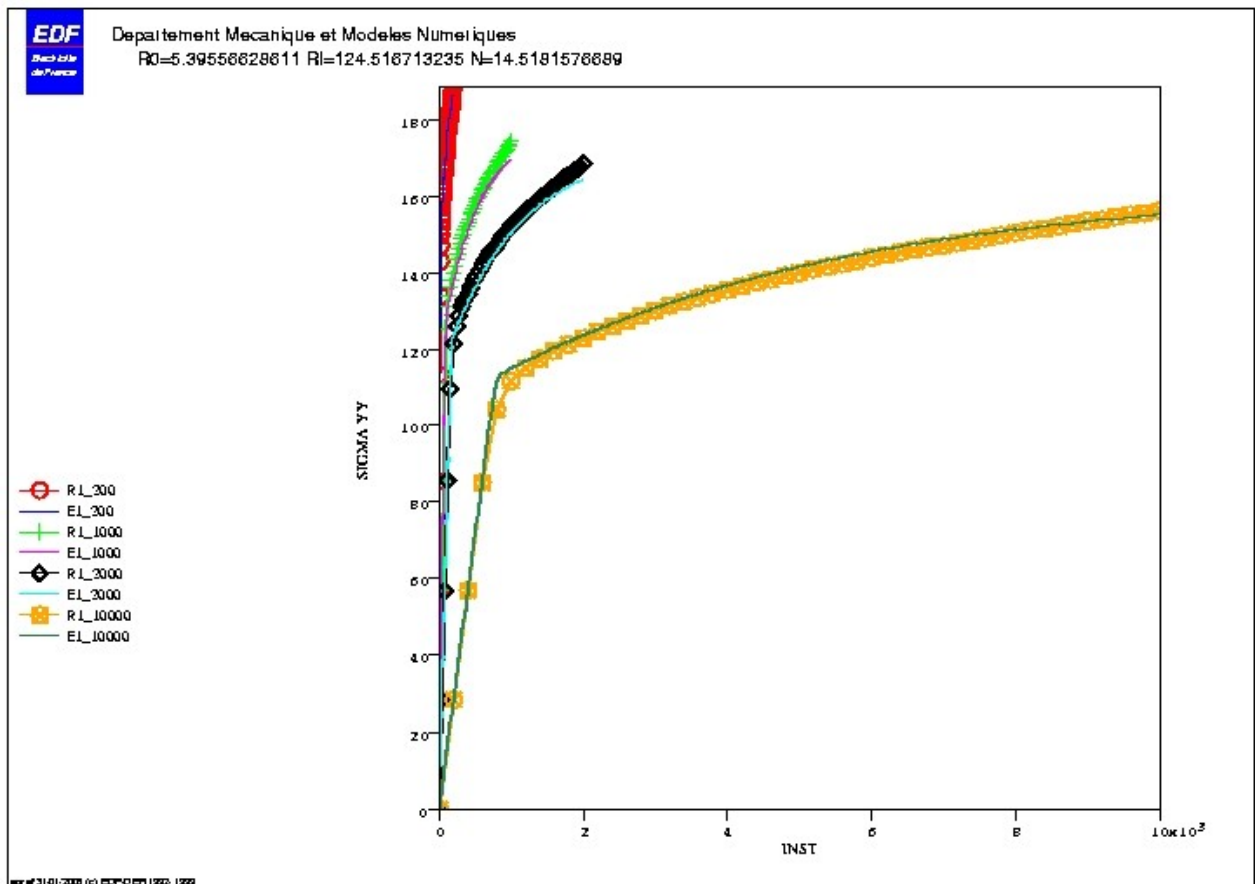
Many nodes: 4  
Many meshes and types: 1 (QUAD4).

## 3.3 Sizes tested and results

Parameter identified: (values of nonregression):

Keyword	Identified value	Aster	% difference
<b>CIN2_CHAB</b>			
R0	5.3955	5.3955	0
R_I	124.5167	124.5167	0
B	0.0936	0.0936	0
K	10.1492	10.1492	0
W	0.1524	0.1524	0
G1_0	530.2700	530.2700	0
C1_I	1065.5520	1065.5520	0
C2_I	276.1403	276.1403	0
A_I	1.2069	1.2069	0
<b>LEMAITRE</b>			
UN_SUR_K	0.003643	0.003643	0
EXP_N	14.5181	14.5181	0

The curves obtained with the optimal parameters are the following ones:



## 4 Summary of the results

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Results got by *Code\_Aster* show the feasibility of the retiming of many parameters on several experimental curves.