

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

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### Summarized:

This test of nonlinear quasi-static mechanics makes it possible to the model validate the retiming of parameters for VISC\_CIN2\_CHAB in 2D the case of an axisymmetric test-tube (stress state and of homogeneous strain) subjected to a simple traction test.

Four curves of tension are used as reference (with different strainrates). The curves of reference result from tests on steel 10CD9–10 with 545°C .

One identifies simultaneously the 11 viscoplastic parameters of the model.  
The modelization of the test-tube is realized 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 state and strains homogeneous, as it is the case in uniaxial tension. It is here about a volume element represented by a square on side 0.01mm . The modelization is axisymmetric, and the tension is done with imposed strain.

### 1.2 Properties of the material

the built-in characteristics are the following ones:

Key word ELAS :

YOUNG = 143006.0 MPa

NU = 0.33

UN\_SUR\_M= 0

G2\_0= 0.28

the parameters to be identified have for initial values and limits:

Key word	initial Value	Limits inf	Limit sup
<b>CIN2_CHAB</b>			
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
<b>Key word LEMAITRE</b>			
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  $EPS_{final} = 0.01$

$H = 0.01$  mm

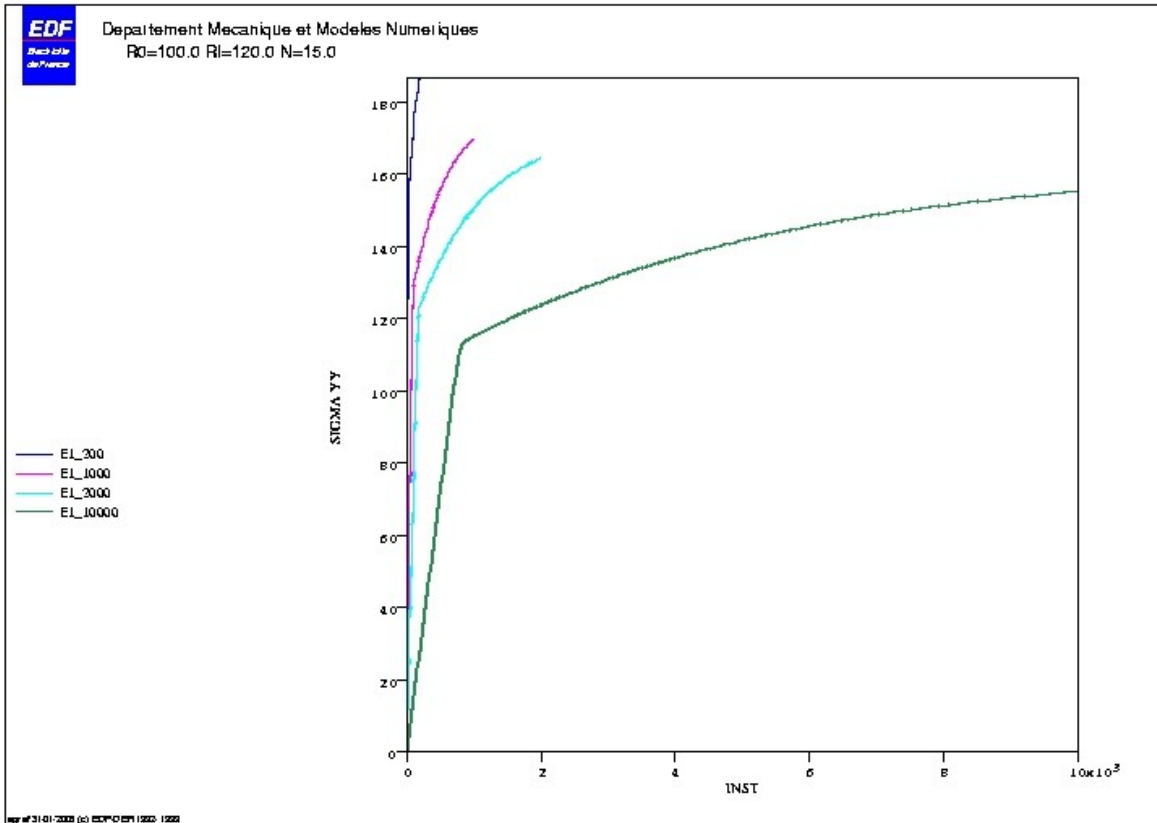
$Tmax = 200s, 1000s, 2000s, 10000s$

This corresponds to strainrates imposed of  $5.10^{-4}/s, 1.10^{-3}/s, 5.10^{-3}/s, 1.10^{-6}/s$  .

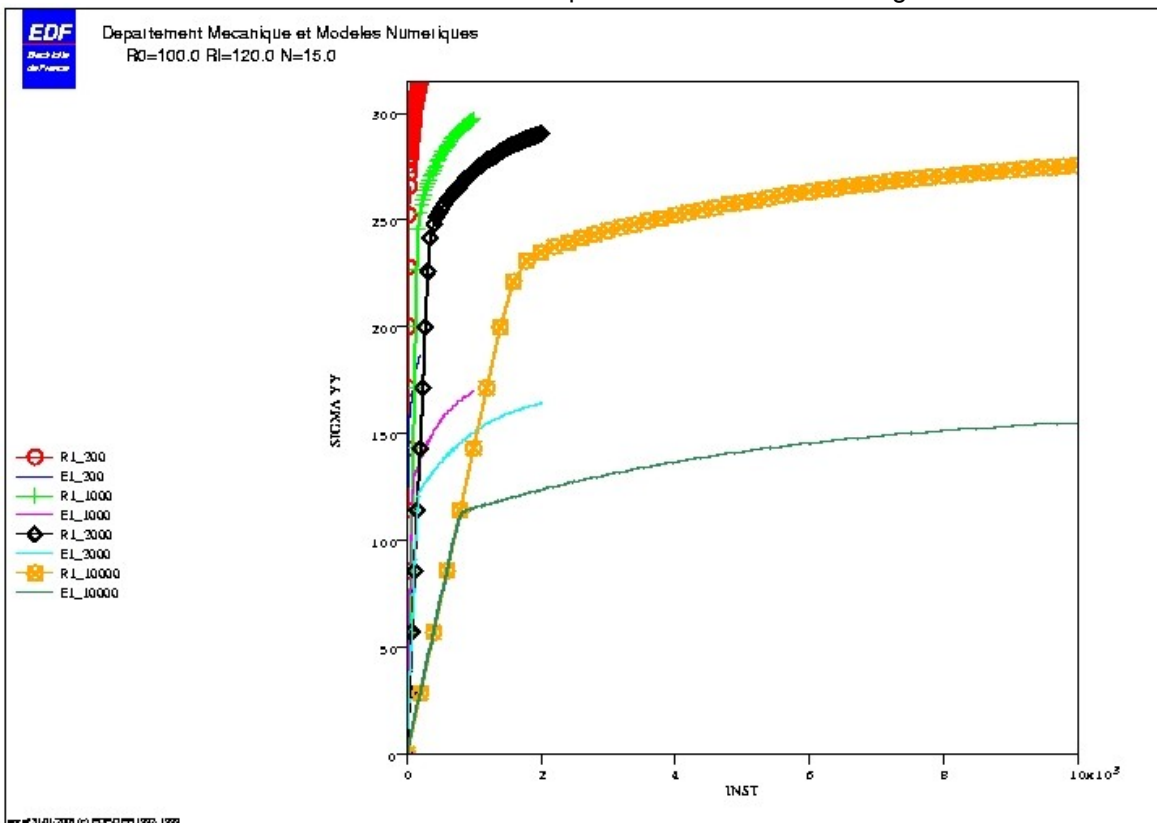
## 1.4 Forced

initial conditions and null strains.

## 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 non regression: values of the parameters

### 2.2 Quantities and results of reference

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

Key word	CIN2_CHAB	identified Value
	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
Key word	LEMAITRE	
	UN_SUR_K	0.003643
	EXP_N	14.5181

### 2.3 Uncertainties on the solution

Without Modelization

## 3 object A

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### 3.1 Characteristic of the modelization

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

### 3.2 Characteristics of the mesh

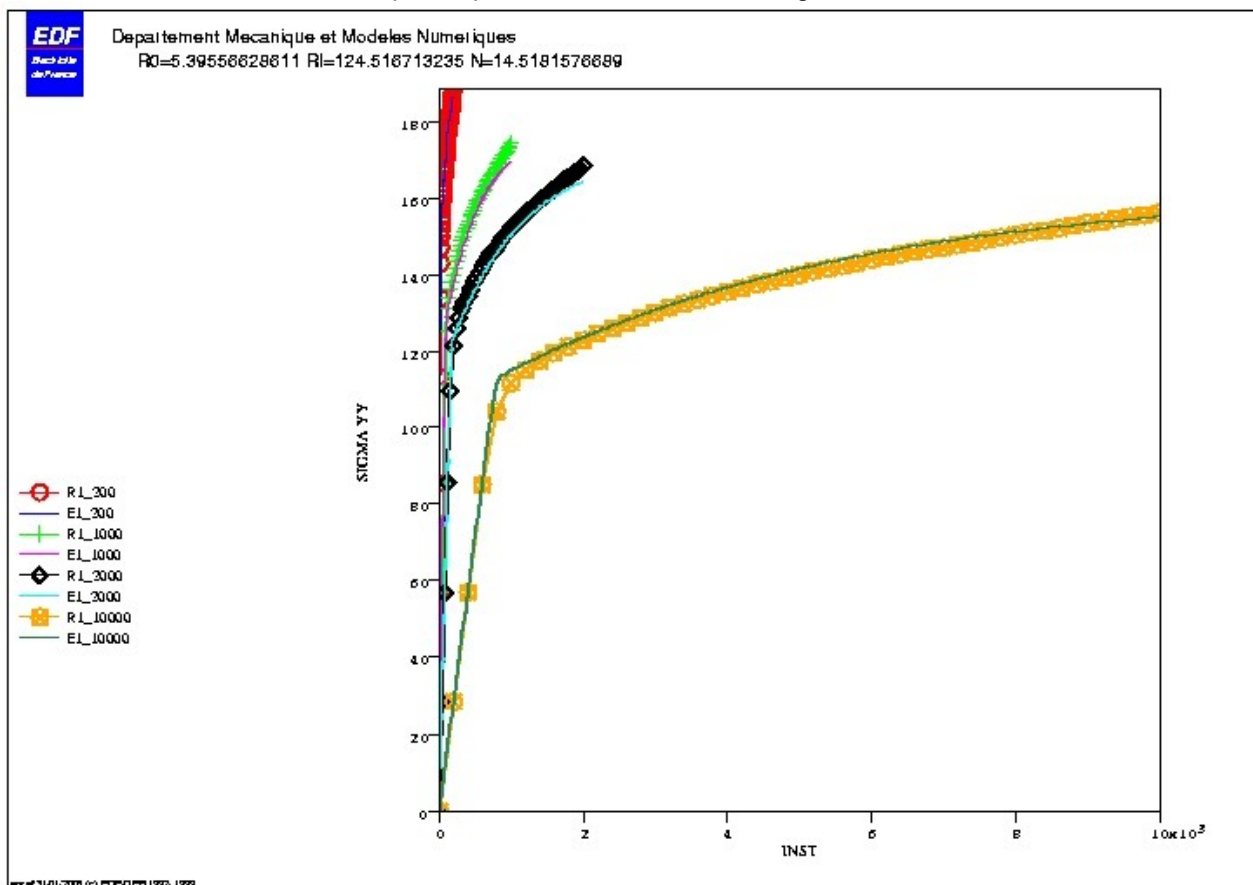
Many nodes: 4  
Number of meshes and types: 1 (QUAD4).

## 3.3 Quantities tested and identified

Parameter results: (values of non regression):

Key	word	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>Key word LEMAITRE</b>				
	UN_SUR_K	0.003643	0.003643	0
	EXP_N	the 14.5181	14.5181	0

curves obtained with the optimal parameters are the following ones:



## 4 Summary of the results

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