

SSNV157 - Test of the method of delocalization per regularization of the deformation on a variable bar of section in traction

Summary:

One presents several tests of uniaxial traction on a variable bar of section for 3 laws of behaviors (ENDO_FRAGILE, ENDO_ISOT_BETON and MAZARS), in the case of the nonlocal model by regularization of the deformation.

1 Problem of reference

1.1 Geometry and boundary conditions

One considers a bar with variable section length 100m , thickness 1m , of greater section 10m and of smaller section 1m .

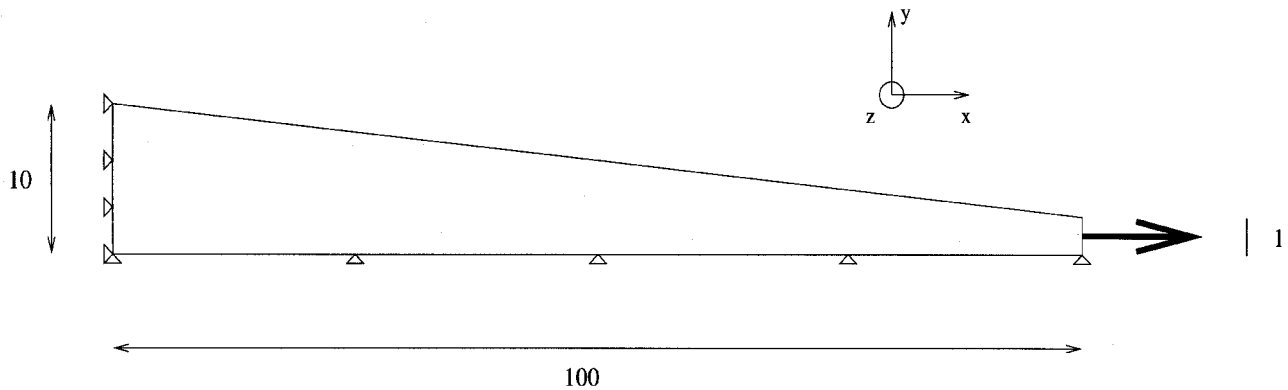


Figure 1.1-a: Geometry and boundary conditions of the uniaxial tests

1.2 Properties of materials

Elastic behavior.

Length characteristic of the delocalization: 3m

2 Reference solution

This test is a test of nonregression.

3 Modeling A

3.1 Parameters of the model/Characteristic of material

ECRO_LINE: SY=3.0
D_SIGM_EPSI=-2000

3.2 Characteristics of modeling

Modeling 3D_GRAD_EPSI

Element MGCA_TETRA10

3.3 Characteristics of the grid

Many nodes: 507
Many meshes and types: 54 TRIA6
174 TETRA10

3.4 Features tested

The law of behavior ENDO_FRAGILE
Type of piloting: PRED_ELAS

3.5 Sizes tested and results

Moment	Name of the field	Component	Place	Aster
24	DEPL	<i>DX</i>	<i>N2</i>	6.66251E-03
24	VARI_ELGA	<i>VI</i>	<i>M169</i> , point 2	9.89289E-01

4 Modeling B

4.1 Parameters of the model/Characteristic of material

ECRO_LINE: SY=3.0
D_SIGM_EPSI=-2000

4.2 Characteristics of modeling

Modeling C_PLAN_GRAD_EPSI

Element MGCA_TRIA6

4.3 Characteristics of the grid

Many nodes: 153
Many meshes and types: 27 SEG3
50 TRIA6

4.4 Features tested

The law of behavior ENDO_FRAGILE
Type of piloting: PRED_ELAS

4.5 Sizes tested and results

Moment	Name of the field	Component	Place	Aster
31	DEPL	<i>DX</i>	<i>N2</i>	9.22566E-03
31	VARI_ELGA	<i>VI</i>	<i>M3I</i> , point 2	9.97526E-01

5 Modeling C

5.1 Parameters of the model/Characteristic of material

ECRO_LINE: SY=3.0
D_SIGM_EPSI=-2000

5.2 Characteristics of modeling

Modeling D_PLAN_GRAD_EPSI

Element MGCA_TRIA6

5.3 Characteristics of the grid

Many nodes: 153
Many meshes and types: 27 SEG3
50 TRIA6

5.4 Features tested

The law of behavior ENDO_FRAGILE
Type of piloting: PRED_ELAS

To optimize under-cuttings of the step of time in the event of not-convergence of the residue, the event is activated DIVE_RESI of DEFI_LIST_INST.

5.5 Sizes tested and results

Momen t	Name of the field	Component	Place	Type of reference	Value of reference	Tolerance
42	DEPL	<i>DX</i>	<i>N2</i>	'NON_REGRESSION'	9.54359E-03	0.1%
42	VARI_ELGA	<i>VI</i>	<i>M31</i> , point 2	'NON_REGRESSION'	9.97659E-01	0.1%

6 Modeling D

6.1 Parameters of the model/Characteristic of material

ECRO_LINE: SY=3.0
D_SIGM_EPSI=-2000

6.2 Characteristics of modeling

Modeling 3D_GRAD_EPSI

Element MGCA_TETRA10

6.3 Characteristics of the grid

Many nodes: 507
Many meshes and types: 54 TRIA6
174 TETRA10

6.4 Features tested

The law of behavior ENDO_ISOT_BETON
Type of piloting: PRED_ELAS

6.5 Sizes tested and results

Moment	Name of the field	Component	Place	Aster
37	DEPL	<i>DX</i>	<i>N2</i>	6.56702E-03
37	VARI_ELGA	<i>VI</i>	<i>MI69</i> , point 2	9.40876E-01

7 Modeling E

7.1 Parameters of the model/Characteristic of material

MAZARS: K = 0.7
EPSD0 = 9.375E-05
AC = 1.15
AT = 1.0
BC = 1391.3
BT = 10000.

7.2 Characteristics of modeling

Modeling 3D_GRAD_EPSI

Element MGCA_TETRA10

7.3 Characteristics of the grid

Many nodes: 507
Many meshes and types: 54 TRIA6
174 TETRA10

7.4 Features tested

The law of behavior MAZARS
Type of piloting: DEFORMATION

7.5 Sizes tested and results

Moment	Name of the field	Component	Place	Aster
17	DEPL	<i>DX</i>	<i>N2</i>	3.11578E-03
17	VARI_ELGA	<i>VI</i>	<i>M169</i> , point 2	4.33175E-01

8 Modeling F

8.1 Parameters of the model/Characteristic of material

MAZARS: K = 0.7
EPSD0 = 9.375E-05
AC = 1.15
AT = 1.0
BC = 1391.3
BT = 10000.

8.2 Characteristics of modeling

Modeling C_PLAN_GRAD_EPSI

Element MGCA_TRIA6

8.3 Characteristics of the grid

Many nodes: 153
Many meshes and types: 27 SEG3
50 TRIA6

8.4 Features tested

The law of behavior MAZARS
Type of piloting: DEFORMATION

8.5 Sizes tested and results

Moment	Name of the field	Component	Place	Aster
51	DEPL	<i>DX</i>	<i>N2</i>	2.27206E-03
51	VARI_ELGA	<i>V1</i>	<i>M31</i> , point 2	9.37885E-01

9 Modeling G

9.1 Parameters of the model/Characteristic of material

MAZARS: K = 0.7
EPSD0 = 9.375E-05
AC = 1.15
AT = 1.0
BC = 1391.3
BT = 10000.

9.2 Characteristics of modeling

Modeling D_PLAN_GRAD_EPSI

Element MGCA_TRIA6

9.3 Characteristics of the grid

Many nodes: 153
Many meshes and types: 27 SEG3
50 TRIA6

9.4 Features tested

The law of behavior MAZARS
Type of piloting: DEFORMATION

9.5 Sizes tested and results

Moment	Name of the field	Component	Place	Aster
51	DEPL	<i>DX</i>	<i>N2</i>	2.39773E-03
51	VARI_ELGA	<i>VI</i>	<i>M31</i> , point 2	9.16055E-01

10 Modeling K

10.1 Parameters of the model/Characteristic of material

They is the same models and materials that for modeling *C* .

10.2 Characteristics of modeling

They are identical to modeling *C* , put except for one activates the event `ERROR`, which allows when calculation diverges to test convergence with the second solution of the equation of piloting before subdividing (see documentation [U4.34.03]).

10.3 Characteristics of the grid

Many nodes: 153
Many meshes and types: 27 SEG3
50 TRIA6

10.4 Sizes tested and results

The values of reference are those of modeling *C* . One validates the fact that the activation of `ERROR` allows to accelerate calculation (33 iterations instead of 42) while finding the same final result.

Moment	Name of the field	Component	Place	Type of reference	Value of reference	Tolerance
33	DEPL	<i>DX</i>	<i>N2</i>	'NON_REGRESSION'	9.54359E-03	0.1%
33	VARI_ELGA	<i>VI</i>	<i>M3I</i> , point 2	'NON_REGRESSION'	9.97659E-01	0.1%