

## Operator RECA\_WEIBULL

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### 1 Goal

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To readjust the parameters of the model of WEIBULL on experimental data. These data consist of one (or several) lists moments of rupture determined in experiments, associated with one (or several) concept result of `STAT_NON_LINE` modelling the tests at these various moments. The module of WEIBULL, or the constraint of cleavage (depending possibly on the temperature), or these two parameters, can be readjusted. One uses the method of maximum of probability or linear regression [R7.02.09] for this retiming.

Product a structure of data of the type `table`.

## 2 Syntax

```
tabl_reca_weib = RECA_WEIBULL (
  ♦ LIST_PARA = / 'Me,
                / 'SIGM_REFE',

  ♦ RESU      = _F (
                ♦ EVOL_NOLI      = resu,      [evol_noli]
                ♦ MODELE        = Mo,        [modele]
                ♦ CHAM_MATER     = chmat,     [cham_mater]
                ◇ TEMPE         = temp,      [R]
                ♦ LIST_INST_RUPT = lreel,     [l_R]
                ♦ / TOUT_ORDRE   = 'YES',
                / NUME_ORDRE     = l_nuor,    [l_I]
                / INST           = l_inst,    [l_R]
                / LIST_INST      = l_inst,    [listis]
                ♦ / ALL          = 'YES',
                / GROUP_MA       = lgrma,     [l_gr_maille]
                ◇ COEF_MULT      = / coeff,   [R]
                / 1,             [DEFECT]
                )

  ◇ OPTION      = / 'SIGM_ELGA',      [DEFECT]
                / 'SIGM_ELMOY',

  ◇ CORR_PLAST  = / 'NOT',            [DEFECT]
                / 'YES',

  ◇ METHODE     = / 'MAXI_VRAI',      [DEFECT]
                / 'REGR_LINE',

  ◇ INCO_GLOB_RELA = / increl,        [R]
                / 1.E-3,             [DEFECT]

  ◇ ITER_GLOB_MAXI = / maglob,        [R]
                / 10,                [DEFECT]

  ◇ INFO        = / 1,                [DEFECT]
                / 2,                  [I]
                )
```

## 3 Operands

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### 3.1 Operand LIST\_PARA

◆ LIST\_PARA  
/ 'Me,  
/ 'SIGM\_REFE',

List of the parameters of the model of Weibull whose retiming is required ( $m$ ,  $\sigma_u$  or both).

### 3.2 Keyword RESU

#### 3.2.1 Operand EVOL\_NOLI

◆ EVOL\_NOLI = resu,  
Name of a concept result of the type evol\_noli.

#### 3.2.2 Operand MODEL

◆ MODEL = Mo,  
Name of the model on which retiming is carried out.

#### 3.2.3 Operand CHAM\_MATER

◆ CHAM\_MATER = chmat,  
Name of the field affected material on the model. This one must imperatively contain the initial value of the parameters of the method of Weibull (keyword WEIBULL of DEFI\_MATERIAU [U4.43.01]) namely:

$V_0$  : volume of reference  
 $m$  : exhibitor of the statistical law of Weibull  
 $\sigma_u$  : constraint of cleavage

#### 3.2.4 Operand TEMPLE

◆ TEMPLE = temp,  
Temperature associated with the result resu. If this one is indicated, the constraint of cleavage will be readjusted  $\sigma_u$  for each result.

#### 3.2.5 Operand LIST\_INST\_RUPT

◆ LIST\_INST\_RUPT = lreel,  
List of the moments of rupture of the base of result resu on which the constraints of Weibull will be calculated (these moments are interpolated if they do not coincide at the moments of the result resu). This list of moments must be strictly increasing and contain at least two moments. The minimum moment (respectively maximum) of this list must of course be necessarily higher (resp. lower) than the minimum moment (resp. maximum) of the list of moments of the result resu.

## 3.2.6 Operands ALL / GROUP\_MA

The fields of calculation are specified by:

◆ / ALL = 'YES',

Only one field is defined and it coincides with all the structure.

/ GROUP\_MA = lgrma,

Each group of meshes of the list lgrma a field of calculation defines.

## 3.2.7 Operands TOUT\_ORDRE / NUME\_ORDRE / INST / LIST\_INST

See [U4.71.00].

## 3.2.8 Operand COEF\_MULT

◇ COEF\_MULT = coeff,

Multiplying coefficient of the power m-ième of the constraint of Weibull intended for the taking into account of symmetries in the field (the value by default is 1. cf. POST\_ELEM [U4.81.22]).

## 3.3 Operand OPTION

/ OPTION = 'SIGM\_ELGA',

The elementary field of the maximum principal constraint is calculated starting from the representation of the stress field at the points of Gauss.

/ OPTION = 'SIGM\_ELMOY',

The elementary field of the maximum principal constraint is calculated starting from the representation of the stress field realised compared to the points of Gauss.

## 3.4 Operand CORR\_PLAST

/ CORR\_PLAST = 'YES',

The stress field of Weibull is evaluated with the plastic correction.

/ CORR\_PLAST = 'NOT',

The stress field of Weibull is evaluated without plastic correction.

## 3.5 Operand METHOD

/ METHOD = 'MAXI\_VRAI',

The method of retiming employed is that of the maximum of probability.

/ METHOD = 'REGR\_LINE',

The method of retiming employed is that of the linear regression.

## 3.6 Keyword INCO\_GLOB\_RELA

◇ INCO\_GLOB\_RELA = / increl, [R]  
/ 1.E-3, [DEFECT]

The algorithm of retiming continues the iterations if:

$$\max\left(\left|\frac{m_{k+1}-m_k}{m_k}\right|; \max_T\left(\left|\frac{\sigma_{u^{(k+1)}}(T)-\sigma_{u^{(k)}}(T)}{\sigma_{u^{(k)}}(T)}\right|\right)\right) > \text{increl}$$

## 3.7 Keyword ITER\_GLOB\_MAXI

◇ ITER\_GLOB\_MAXI = / maglob, [R]  
/ 10, [DEFECT]

Iteration count of maximum retiming carried out.

## 3.8 Operand INFORMATION

◇ INFORMATION =

Indicate the level of impression of the results of the operator,

- 1: no impression,
- 2: impression of the relative information to retiming.

The impressions are done in the file 'MESSAGE'.

## 4 Example of use

For the use of RECA\_WEIBULL, one will be able to refer to the case test SSNA103 [V6.01.103].

It is an axisymmetric modeling of a cylindrical test-tube (407 mm length and radius of 68 mm) subjected to a traction. Example of retiming of the parameter  $\sigma_u$  method of Weibull by the method of regression linear on three bases of results corresponding to temperatures distinct (the module from Weibull  $m$  is fixed and equal to 24).

### Results:

To resulting from retiming, the table result gives for each constraint of Weibull, the experimental and theoretical probabilities of rupture as for each temperature T associated with a base with results, the module of Weibull  $m$  retained and the constraint of cleavage  $\sigma_u$  readjusted.

table T1

SIGMA_WEIBULL	PROBA_EXP	PROBA_THE	TEMP	M	SIGMA_U
2.08428E+03	1.06871E-03	6.25000E-02	-	-	-
2.37776E+03	7.43857E-02	6.25000E-02	-	-	-
2.46999E+03	1.75251E-01	1.25000E-01	-	-	-
2.47245E+03	1.79089E-01	1.87500E-01	-	-	-
2.47546E+03	1.83876E-01	2.50000E-01	-	-	-
2.49280E+03	1.15850E-01	6.25000E-02	-	-	-
2.52318E+03	1.51827E-01	1.25000E-01	-	-	-
2.56806E+03	2.22304E-01	1.87500E-01	-	-	-
2.57728E+03	4.14074E-01	3.12500E-01	-	-	-
2.57965E+03	1.63465E-01	1.25000E-01	-	-	-
2.58412E+03	4.34295E-01	3.75000E-01	-	-	-
2.58768E+03	4.45012E-01	4.37500E-01	-	-	-
2.59680E+03	2.79917E-01	2.50000E-01	-	-	-
2.59780E+03	4.76213E-01	5.00000E-01	-	-	-
2.60437E+03	4.96954E-01	5.62500E-01	-	-	-
2.60474E+03	2.97664E-01	3.12500E-01	-	-	-
2.61696E+03	5.37625E-01	6.25000E-01	-	-	-
2.62152E+03	2.31018E-01	1.87500E-01	-	-	-
2.63019E+03	3.59960E-01	3.75000E-01	-	-	-
2.63703E+03	3.78073E-01	4.37500E-01	-	-	-
2.64761E+03	6.39443E-01	6.87500E-01	-	-	-
2.65847E+03	3.07571E-01	2.50000E-01	-	-	-
2.68228E+03	3.65713E-01	3.12500E-01	-	-	-
2.68274E+03	5.11962E-01	5.00000E-01	-	-	-
2.69140E+03	7.79587E-01	7.50000E-01	-	-	-
2.70481E+03	8.18018E-01	8.12500E-01	-	-	-
2.70819E+03	5.93363E-01	5.62500E-01	-	-	-
2.71978E+03	4.70198E-01	3.75000E-01	-	-	-
2.72917E+03	8.79111E-01	8.75000E-01	-	-	-
2.73173E+03	6.69628E-01	6.25000E-01	-	-	-
2.73291E+03	5.09893E-01	4.37500E-01	-	-	-
2.73574E+03	8.93367E-01	9.37500E-01	-	-	-
2.74213E+03	7.02782E-01	6.87500E-01	-	-	-
2.75526E+03	7.43533E-01	7.50000E-01	-	-	-
2.75581E+03	7.45195E-01	8.12500E-01	-	-	-
2.75636E+03	7.46854E-01	8.75000E-01	-	-	-
2.77232E+03	6.34158E-01	5.00000E-01	-	-	-
2.77688E+03	8.06319E-01	9.37500E-01	-	-	-
2.79613E+03	7.09063E-01	5.62500E-01	-	-	-
2.80708E+03	7.42320E-01	6.25000E-01	-	-	-
2.81475E+03	7.64896E-01	6.87500E-01	-	-	-
2.81803E+03	7.74361E-01	7.50000E-01	-	-	-
2.84430E+03	8.44366E-01	8.12500E-01	-	-	-
2.88043E+03	9.19411E-01	8.75000E-01	-	-	-
3.00687E+03	9.99143E-01	9.37500E-01	-	-	-

# Code\_Aster

Version  
default

Titre : Opérateur RECA\_WEIBULL  
Responsable : HABOUSSA David

Date : 07/12/2017 Page : 7/7  
Clé : U4.82.06 Révision :  
d34dfdd96fa1

-	-	-	-5.00000E+01	2.40000E+01
2.77168E+03	-	-	-1.00000E+02	2.40000E+01
-	-	-	-1.50000E+02	2.40000E+01
2.72013E+03	-	-	-1.50000E+02	2.40000E+01
-	-	-	-1.50000E+02	2.40000E+01
2.64542E+03	-	-	-1.50000E+02	2.40000E+01