

Operator RECA_WEIBULL

1 Goal

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

3.1 Operand LIST_PARA

◆ LIST_PARA
/ 'Me,
/ 'SIGM_REFE',

List of the parameters of the model of Weibull whose retiming is required (m , σ_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
 σ_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 σ_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_REL

◇ INCO_GLOB_REL = / 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 σ_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 σ_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*

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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