Operator RECA_WEIBULL

1 Drank

To readjust the parameters of the Weibull model on experimental data. These data make up of one (or several) lists times of fracture determined in experiments, associated with one (or several) result concept of STAT_NON_LINE modelling the tests at these various times. The modulus of WEIBULL, or the stress 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 data structure of the type counts.

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2 Syntax

```
tabl_reca_weib = RECA_WEIBULL  (

   ♦LISTE_PARA=/          "Me,
                  /   "SIGM_REFE",

   ♦RESU=_F             (
                        ♦EVOL_NOLI=resu              ,          [evol_noli]
                        ♦MODELE=mo                   ,             [model]
                        ♦CHAM_MATER=chmat            ,          [cham_mater]
                        ◊TEMPE=temp                  ,          [R]
                        ♦LISTE_INST_RUPT=lreel       ,          [l_R]
                                        ♦/TOUT_ORDRE=' OUI',
                           /NUME_ORDRE          =l_nuor  ,    [l_I]
                           /INST                =l_inst  ,    [l_R]
                           /LIST_INST              =l_inst  ,    [listis]
                                               ♦/TOUT=' OUI',
                           /GROUP_MA            =lgrma   ,
[l_gr_maille]
                           /MAILLE                 =l_maille   ,
[l_maille]
                        ◊COEF_MULT=/coef                  ,       [R]
                                                /1  ,          [DEFAULT]
                        )

   ◊OPTION=/                  "SIGM_ELGA",                  [DEFAULT]
                           /   "SIGM_ELMOY",

   ◊CORR_PLAST=/              "NON",                        [DEFAULT]
                           /   "OUI',

   ◊METHODE=/                 "MAXI_VRAI",                  [DEFAULT]
                           /   "REGR_LINE",

   ◊INCO_GLOB_RELA=/increl          ,                       [R]
                           /1.E-3 ,                         [DEFAULT]

   ◊ITER_GLOB_MAXI=/maglob          ,                       [R]
                           /10 ,                            [DEFAULT]

   ◊INFO=/1                      ,                          [DEFAULT]
                           /2  ,                            [I]

                              )
```

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3 Operands

3.1 Operand LIST_PARA

♦LISTE_PARA
/ "Me,
/ "SIGM_REFE",

Lists parameters of the Weibull model whose retiming is required (m , σ_u or both).

3.2 Key word RESU

3.2.1 Operand EVOL_NOLI

♦EVOL_NOLI=resu ,

Name of a result concept of the evol_noli type.

3.2.2 Operand MODELS

♦MODELE=mo ,

Name of the model on which is carried out retiming.

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 (key word WEIBULL of DEFI_MATERIAU [U4.43.01]) namely:

V_0 : volume of reference
m : exhibitor of the statistical model of Weibull
σ_u : stress of cleavage

3.2.4 Operand TEMPE

◊TEMPE=temp ,

Temperature associated with result the resu. If this one is indicated, one will readjust the stress of cleavage σ_u for each result.

3.2.5 Operand LIST_INST_RUPT

♦LISTE_INST_RUPT=lreel ,

List of times of fracture of the base of result resu over which the stresses of Weibull will be calculated (these times are interpolated if they do not coincide at times of result the resu). This list of times must be strictly increasing and contain at least two times. The minimum time (respectively maximum) of this list must of course be necessarily higher (resp. lower) than minimum time (resp. maximum) of the list of times of result the resu.

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3.2.6 Operands TOUT / GROUP_MA / MESH

the fields of computation are specified by:

♦/TOUT=' OUI',

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

/GROUP_MA =lgrma ,

Each mesh group of the list lgrma defines a field of computation.

/MAILLE =l_maille ,

Each mesh of the list l_maille defines a field of computation.

3.2.7 Operands TOUT_ORDRE / NUME_ORDRE / INST / LIST_INST

See [U4.71.00].

3.2.8 Operand COEF_MULT

◊COEF_MULT=coef ,

multiplying Coefficient of the power m-ième of the stress of Weibull intended for the taking into account of symmetries in the field (the default value is 1. cf POST_ELEM [U4.81.22]).

3.3 Operand OPTION

/OPTION = ' SIGM_ELGA',

the elementary field of the maximum principal stress is calculated from the representation of the stress field to Gauss points.

/OPTION = ' SIGM_ELMOY',

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

3.4 Operand CORR_PLAST

/CORR_PLAST = ' OUI',

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

/CORR_PLAST = ' NON',

the stress field of Weibull is evaluated without plastic correction.

3.5 Operand METHODE

/METHODE = ' MAXI_VRAI',

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

/METHODE = ' REGR_LINE',

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

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3.6 Key word INCO_GLOB_RELA

```
◊INCO_GLOB_RELA=/increl          ,       [R]
                /1.E-3 ,                 [DEFAULT]
```

the algorithm of retiming continues the iterations if:

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

3.7 Key word ITER_GLOB_MAXI

```
◊  ITER_GLOB_MAXI=/maglob        ,       [R]
                  /10 ,                  [DEFAULT]
```

Nombre of iterations of retiming maximum carried out.

3.8 Operand INFO

```
◊INFO=
```

Indicates the level of printing of the results of the operator,

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

The printings are made in the file "MESSAGE".

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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 modelization of a cylindrical test-tube (407 mm length and radius of 68 mm) subjected to a tension. Example of retiming of the parameter σ_u of the method of Weibull by the method of regression linear on three bases of results corresponding with distinct temperatures (the modulus of Weibull m is built-in and equal to 24).

Results:

To resulting from retiming, the array result gives for each stress of Weibull, the experimental and theoretical probabilities of fracture as for each temperature T associated with a base of results, the modulus of Weibull m selected and the stress of cleavage σ_u readjusted.

count 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	-	-	-

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

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