Structure of Data table_TRC

Summary:

One explains in this document how to exploit a structure of data table_TRC in an elementary routine of calculation te00ij.

Contents

1 The structure of data table_TRC is one sd_table

The structure of data tabl_TRC is one by means of computer sd_table [D4.02.05]. It consists of columns of values (SPEED, PARA_EQ,...) cf [§5]. The goal of this document is not to describe one SD already described, but to show how one recovers in the routines TE00IJ values given by the user in the order DEFI_TRC.

The order DEFI_TRC built one sd_table "diagonal by blocks". This sd_table "is linearized" in the total orders of mechanics via the routine tbexlr [D6.06.01] called by the routine of construction of coded material (rcmaco) ; i.e. it is transformed into a list of realities which is then accessible in the routines TE00IJ.

2 Let us start from an example, the test hsnv101a

```
trc = DEFI_TRC (HIST_EXP: (VALE: (-1.106D+03  1.100D+01 8.563D+00 -2.760D-02
                                  1.220D-04 -2.955D-07 3.402D-10 -1.517D-13
                                  0.000D+00  0.000D+00 0.000D+00  8.360D+02
                                  0.000D+00  0.000D+00 0.000D+00  6.001D+02
                                  0.000D+00  0.000D+00 1.000D+00  3.450D+02)
                           )
                         (VALE: (-2.206D+03  1.100D+01 8.563D+00 -2.760D-02
                                   1.220D-04 -2.955D-07 3.402D-10 -1.517D-13
                                   0.000D+00  0.000D+00 0.000D+00  8.360D+02
                                   0.000D+00  0.000D+00 0.000D+00  6.001D+02
                                   0.000D+00  0.000D+00 1.000D+00  3.450D+02)
                           )
                TEMP_MS:     (P     :  1.100D+01
                              THRESHOLD:  4.500D-01
                              AKM    : -3.125D+01
                              BKM    :  1.406D+01
                              TPLM   : -3.497D+03
                             )
                  ) ;
```

3 Explanations of the values given

3.1 Keyword factor HIST_EXP

The first 8 values of the keyword VALE under the keyword factor HIST_EXP define the thermal history:

- the first value is the value of the derivative of the function T (T) speed of cooling,
- the second value is the parameter of equivalence temps_température defining the austenitization,
- the 6 following values define the coefficients of the students' rag processions of degree 0 to 5 such as the polynomial of a nature 5 thus built either the interpolation enters AR3 and TMF within the meaning of least squares of the function F (T) deduced from the thermal history and such as F (T) = ln (T (T)).

The following values (necessarily by group of 4) define the respective proportions of ferrite, pearlite and bainite present at a temperature given for the experimental thermal history defined by the first 8 values.

3.2 Keyword factor TEMP_MS

These 5 values define the sizes intervening in the law of evolution of the temperature Ms according to conditions of austenitization and the quantities of ferrite, pearlite and bainite already formed. This law is associated with a diagram TRC.

4 Definition of the blocks

The table thus produced is “diagonal per blocks”, i.e. the table breaks up into blocks.

- The first 8 values of the keyword VALE under the keyword factor HIST_EXP find themselves in block 1 with NB_POINT defining quadrupled,
- Block 2 defines the respective proportions of ferrite, pearlite and bainite, the following values of the keyword VALE under the keyword factor HIST_EXP,
- Block 3 defines the laws associated with each diagram TRC.

5 Impression of the table of the type tabl_trc

Block 1:

SPEED	PARA_EQ	COEF_0	COEF_1	COEF_2	COEF_3	COEF_4	COEF_5	NB_POINT
1.106E+03	1.100E+01	8.563E+00	-2.760E-02	1.220E-04	-2.955E-07	3.402E-10	-1.517E-13	3.
2.206E+03	1.100E+01	8.563E+00	-2.760E-02	1.220E-04	-2.955E-07	3.402E-10	-1.517E-13	3.

Block 2:

Z1	Z2	Z3	TEMP
0.00000E+00	0.00000E+00	0.00000E+00	8.36000E+02
0.00000E+00	0.00000E+00	0.00000E+00	6.00100E+02
0.00000E+00	0.00000E+00	1.00000E+00	3.45000E+02
0.00000E+00	0.00000E+00	0.00000E+00	8.36000E+02
0.00000E+00	0.00000E+00	0.00000E+00	6.00100E+02
0.00000E+00	0.00000E+00	1.00000E+00	3.45000E+02

Block 3:

P	THRESHOLD	AKM	BKM	TPLM
1.10000E+01	4.50000E-01	-3.12500E+01	1.40600E+01	-3.49700E+03

6 List of realities produced by linearization of the table

```
3.00000E+00
9.00000E+00   2.00000E+00
1.10600E+03   1.10000E+01  8.56300E+00 -2.76000E-02  1.22000E-04  2.95500E-
07  3.40200E-10
-1.51700E-13  3.00000E+00
2.20600E+03   1.10000E+01  8.56300E+00 -2.76000E-02  1.22000E-04  2.95500E-
07  3.40200E-10
-1.51700E-13  3.00000E+00
4.00000E+00   6.00000E+00
0.00000E+00   0.00000E+00  0.00000E+00  8.36000E+02
0.00000E+00   0.00000E+00  0.00000E+00  6.00100E+02
0.00000E+00   0.00000E+00  1.00000E+00  3.45000E+02
0.00000E+00   0.00000E+00  0.00000E+00  8.36000E+02
0.00000E+00   0.00000E+00  0.00000E+00  6.00100E+02
0.00000E+00   0.00000E+00  1.00000E+00  3.45000E+02
5.00000E+00   1.00000E+00
1.10000E+01   4.50000E-01 -3.12500E+01  1.40600E+01 -3.49700E+03
```

Decoding:

`3.00000E+00`: the table is composed of 3 blocks

`9.00000E+00  2.00000E+00`: the 1st block made up of 9 columns and 2 lines
…: values of the 1ier block line by line

`4.00000E+00  6.00000E+00`: the 2nd block made up of 4 columns and 6 lines
…: values of the 2nd block line by line

`5.00000E+00  1.00000E+00`: the 3rd block made up of 5 columns and 1 line
…: values of the 3rd block

7 Examples to recover a value in the list of realities

7.1 Example 1

If one wants to recover `SPEED` second keyword factor `HIST_EXP`, it is necessary to shift:

```
quickly = ListR8 (1 + 2 + 9 + 1)
                1                  : HIST_EXP is stored in the 1st block
                    2              : 2 numbers to dimension the 1ier block
                       9           : 9 values to define a keyword factor
                             1     : "SPEED" is in position 1
```

7.2 Example 2

2 quantities which one finds in te00ij :

NBHIST	many experimental thermal stories
	= number of keywords factors HIST_EXP
	= many lines of block 1

NBTRC	many laws of evolution of the temperature
	= number of keywords factors TEMP_Ms
	= many lines of block 3

in our example, we find these values:

```
NBHIST = ListR8 (1 + 2) = 2
NBTRC  = ListR8 (1 + 2 + 9*2 + 2 + 4*6 + 2) = 1
```