Data format table_TRC

Summarized:

One explains in this document how to exploit a data structure table_TRC in a routine of elementary computation te0ij.

Contents

1 the data structure table_TRC is a sd_table

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

Command DEFI_TRC builds diagonal sd_table a "per blocks". This sd_table "is linearized" in the global commands of mechanics via the routine tbexlr [D6.06.01] called by the routine of construction of the coded material (rcmaco); i.e. it is transformed into a list of realities which is then accessible in 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
                              SEUIL:  4.500D-01
                              AKM    : -3.125D+01
                              BKM    :  1.406D+01
                              TPLM   : -3.497D+03
                              )
                   );
```

3 Explanations of the values given

3.1 Key word factor HIST_EXP

the first 8 values of the key word VALE under the key word factor HIST_EXP define the thermal history:

- the first value is the value of derivative of the function T (T) velocity 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 between AR3 and TMF within the meaning of the 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 Key word factor TEMP_MS

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

4 Definition of the blocks

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

- The first 8 values of the key word VALE under the key word factor HIST_EXP are found in defining block 1 with NB_POINT quadrupled,
- block 2 defines the respective proportions of ferrite, pearlite and bainite, the following values of the key word VALE under the key word factor HIST_EXP,
- block 3 defines the models associated with each diagram TRC.

5 Printing of the array of the type tabl_trc

Block 1:

VELOCITY	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	SEUIL	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 array

```
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 array 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 `the VELOCITY` of the second key word factor `HIST_EXP`, it is necessary to shift:

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

7.2 Example 2

2 quantities which one finds in the te00ij :

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

NBTRC	many laws of evolution of the temperature
	= number of key words 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
```