

Operator LIRE_FONCTION

1 Goal

To see a data file containing of the actual values representing a function. Product a concept of the type `function` [U4.31.02] or `tablecloth` [U4.31.03].

2 Syntax

```

F [function] = LIRE_FONCTION (
    ♦ UNIT = U, [I]
    ◇ FORMAT =/ 'FREE', [DEFECT]
              / 'NUMPY',
    ◇ SEPARATOR =/ 'Nun', [DEFECT]
                  / sep, [K]
    ♦ NOM_PARA = cf keyword are equivalent of DEFI_FONCTION
[U4.31.02],
    ◇ NOM_RESU = cf keyword are equivalent of DEFI_FONCTION
[U4.31.02],
    ◇ Interpol = idem
    ◇ PROL_DROITE = idem
    ◇ PROL_GAUCHE = idem
    ◇ VERIF = idem
    ◇ TITLE = idem
    ◇ INFORMATION = idem
    ◇ INDIC_PARA = / [1.1], [DEFECT]
                  / [indice1, indice2]
    ◇ TYPE = / 'FUNCTION', [DEFECT]
              / 'FONCTION_C',
              / 'TABLECLOTH',
    if TYPE=' FONCTION':
    ◇ INDIC_RESU = / [1.2], [DEFECT]
                  / [indice1, indice2]
    if TYPE=' FONCTION_C':
    ◇ FORMAT_C = / 'REEL_IMAG' [DEFECT]
                 / 'MODULE_PHASE',
    if FORMAT_C=' REEL_IMAG':
    ♦ INDIC_REEL = / [1.2], [DEFECT]
    ♦ INDIC_IMAG = / [1.3], [DEFECT]
    if FORMAT_C=' MODULE_PHASE':
    ♦ INDIC_MODU = / [1.2], [DEFECT]
    ♦ INDIC_PHAS = / [1.3], [DEFECT]
    if TYPE=' NAPPE':
    ♦ NOM_PARA_FONC = cf keyword NOM_PARA
    ♦ INDIC_ABSCISSE = [indice1, indice2], [1_I]
    ◇ INTERPOL_FONC = cf keyword INTERPOL
    ◇ PROL_DROITE_FONC = cf keyword PROL_DROITE
    ◇ PROL_GAUCHE_FONC = cf keyword PROL_GAUCHE
    ◇ DEFI_FONCTION = _F (
    ♦ INDIC_RESU = [indice1, indice2], [1_I]
    )
)

```

3 Operands

3.1 Operand UNIT

◆ UNIT = U

Entirety, logical number of the unit of reading, defining the file in which the data are read.

3.2 Operand FORMAT

◇ FORMAT = 'FREE' or 'NUMPY',

Indicate the format of the file to reading. Format NUMPY indicate that the file was produced by `numpy.save`; with the format FREE, it is about a simple textual file.

3.3 Operand SEPARATOR

◇ SEPARATOR = 'Nun' or sep

Separating character of the columns of figures in the file with reading.

The value by default 'Nun' mean one or more white characters. For the other separators, white characters are tolerated between the figures and the separator `sep` itself.

Is not used with the format NUMPY.

3.4 Operands **PROL_DROITE** / **PROL_GAUCHE/NOM_PARA/NOM_RESU/INTERPOL/VERIF/TITLE/INFORMATION**

The digital values are read in the file indicated, then the function is actually created by LIRE_FONCTION while calling DEFI_FONCTION or DEFI_NAPPE.

Thus, these keywords are taken again with identical DEFI_FONCTION or DEFI_NAPPE and allow to specify the characteristics of the produced function: interpolation, prolongations, names of the parameters of access.

3.5 Operand INDIC_PARA

◇ INDIC_PARA = / [indice1, indice2]

This keyword is identical in its principle to the keyword VALE_PARA order DEFI_FONCTION. It makes it possible to choose the column of figures in the file read which will define the X-coordinates of the function, are the values of the parameter.

One expects obligatorily a list of two entireties: the first indicating the number of 'block' in the file (cf paragraph [§4] Examples), the second indicating the number of the column. To identify the blocks of the file, one regards as separator of blocks any line which would not exclusively contain figures and separators of columns. The columns are defined by the presence of separators of columns delimiting them (keyword SEPARATOR).

The value by default is [1.1]: the first column of the first block is read.

With the format NUMPY, there is not that a "block" thus the first index is worth always 1.

3.6 Operand TYPE

◇ TYPE = / 'FUNCTION', [DEFECT]
/ 'FONCTION_C',
/ 'TABLECLOTH',

Specify the type of function read and created: 'FUNCTION', 'FONCTION_C' (call in the macro - order with DEFI_FONCTION) or 'TABLECLOTH' (call to DEFI_NAPPE).

3.7 Case of a real function: TYPE=' FONCTION '

◇ INDIC_RESU = / [indice1, indice2]

Of operation identical to INDIC_PARA, this keyword makes it possible to choose the column of figure in the file read defining the ordinates of the function, are the values of the result.

The value by default is [1.2]: the second column of the first block is read.
With the format NUMPY, there is only one "block".

3.8 Case of a complex function: TYPE=' FONCTION_C '

◇ FORMAT_C = 'REEL_IMAG'

◆ INDIC_REEL = / [indice1, indice2]

◆ INDIC_IMAG = / [indice1, indice2]

◇ FORMAT_C = 'MODULE_PHASE'

◆ INDIC_MODU = / [indice1, indice2]

◆ INDIC_PHAS = / [indice1, indice2]

In the case of a complex function, two columns of figures (actual values) are to be identified in the file read to define the list of the complex values of the result. One can thus read with the imaginary choice left real/left or modulates/phase. The phase is expressed in radian.

The values by default are respectively [1.2] and [1.3]: the second and third columns of the first block are read. The first column read by default having been the value of the parameter (INDIC_PARA).

3.9 Case of a tablecloth: TYPE=' NAPPE '

◆ NOM_PARA_FONC = cf keyword NOM_PARA
◆ INDIC_ABSCISSE = [indice1, indice2],
◇ INTERPOL_FONC = cf keyword Interpol
◇ PROL_DROITE_FONC = cf keyword PROL_DROITE
◇ PROL_GAUCHE_FONC = cf keyword PROL_GAUCHE
◇ DEFI_FONCTION = _F (
◆ INDIC_RESU = [indice1, indice2],

The principle is the same one as that of DEFI_NAPPE [U4.31.03]: the list of possible values of the parameter (second variable) having been defined by INDIC_PARA, it remains to identify the functions in the file read by the keyword factor DEFI_FONCTION (analogue with the keyword factor FUNCTION of DEFI_NAPPE). Attention, the number of identified functions (occurrences of the keyword factor) will have to be identical to the cardinal of the values read by INDIC_PARA.

Contrary to the tablecloths in general, one imposes that the functions divide the same list of values of X-coordinates INDIC_ABSCISSE, this is why only INDIC_RESU is present under the keyword factor DEFI_FONCTION.

Keywords '_FONC' apply to the functions of the tablecloth (cf. DEFI_NAPPE, keyword factor DEFI_FONCTION [U4.31.03]).

4 Examples of use

That is to say the textual file following containing information to reading. It is composed of columns of figures, here separated by white characters, defining blocks, themselves delimited by free text.

Any line including of other characters that figures and the preset separator is regarded as free text delimiting. There are thus 4 blocks in the following file:

```
aaa bbb ccc
ddd
eee FF
0.      0.      0.
0.1     1.      10.
0.2     2.      20.
0.3     3.      30.
xxx yyy
www zzz
0.4     4.      40.      400.
0.5     5.      50.      500.
0.6     6.      60.      600.
xxx
70.     700.
80.     800.
90.     900.
PPP qqg
8.8
9.9
```

4.1 Reading of a simple function

By exploiting the values by default for the choice of the columns:

```
F=LIRE_FONCTION ( UNIT = 38,
                  NOM_PARA = 'INST', )
```

The function thus created is:

X-coordinates = [0. , 0.1,0.2,0.3]

Ordinates = [0. , 1. , 2. , 3.]

While associating for X-coordinates and ordinates of the columns taken in different blocks:

```
F=LIRE_FONCTION ( UNIT = 38,
                  NOM_PARA = 'INST',
                  INDIC_PARA = [2.4],
                  INDIC_RESU = [3.1],
```

The function thus created is:

X-coordinates = [400. , 500. , 600.]

Ordinates = [70. , 80. , 90.]

Attention, the order checks whereas the cardinals of the columns defined by `INDIC_PARA` and `INDIC_RESU` are quite identical. What would not have been the case here with for example `INDIC_PARA = [1.3]`.

4.2 Reading of a complex function

By exploiting the values by default for the choice of the columns:

```
F=LIRE_FONCTION ( UNIT          = 38,  
                  NOM_PARA     = 'INST',  
                  TYPE         = 'FONCTION_C',  
                  FORMAT_C     = 'REEL_IMAG', )
```

The function thus created is:

X-coordinates = [0. , 0.1,0.2,0.3]

Ordinates = [(0. , 0.), (1. , 10.), (2. , 20.), (3. , 30.)]

One could of course have specified other columns for INDIC_REEL and INDIC_IMAG that those by default. Attention however to point on columns in the same way cardinal.

4.3 Reading of a tablecloth

By exploiting the values by default for the choice of the columns:

```
F=LIRE_FONCTION ( UNIT          = 38,  
                  NOM_PARA     = 'INST',  
                  INDIC_PARA   = [4.1],  
                  NOM_PARA_FONC = 'FREQ',  
                  INDIC_ABS_CISSE = [2.2],  
                  DEFI_FONCTION = ( F ( INDIC_RESU = [3.1], ),  
                                     F ( INDIC_RESU = [2.3], ), ) )
```

The tablecloth thus created is:

For the value of parameter INST=8.8, the function:

X-coordinates = [4. , 5. , 6.]

Ordinates = [70. , 80. , 90.]

For the value of parameter INST=9.9, the function:

X-coordinates = [4. , 5. , 6.]

Ordinates = [40. , 50. , 60.]

The checks of coherence of the cardinals of columns of X-coordinates and ordinates are made by the order.