Operator CALC_FONC_INTERP

1 Goal

To build a concept of the type function or fonction_c starting from a function FORMULA to 1 or 2 variables. Can be defined real functions with real variables, complex functions with real variables and tablecloths.

One can also produce a new real or complex function, or a tablecloth by interpolating another standard function in the same way (real, complex or a tablecloth).

The use of CALC_FONC_INTERP a tabulation of the formula preliminary to calculation allows. Its use is recommended before any transitory and/or nonlinear analysis for reasons of performances.

The operator is not réentrant, it produces a new function or a tablecloth.

2 Syntax

```
Fr [*] = CALC_FONC_INTERP

             (  ♦  FUNCTION = F                              /  [formula]
                                                             /  [formule_c]
                                                             /  [function]
                                                             /  [fonction_c]
                                                             /  [tablecloth]

                ◊  NOM_RESU =   /'TOUTRESU'  ,                  [DEFECT]
                                / NR         ,                  [K8]
                ◊  NOM_PARA =   Np,

                ♦  /  VALE_PARA =  lvale,                    [l_R]
                   /  LIST_PARA =  will lpara   ,
   [listr8]

                ◊  PROL_DROITE =   /'CONSTANT',
                                   /'LINEAR',
                                   /'EXCLUDED'   ,              [DEFECT]

                ◊  PROL_GAUCHE =   /'CONSTANT',
                                   /'LINEAR',
                                   /'EXCLUDED'   ,              [DEFECT]

                ◊  Interpol =   /  'FLAX',                      [DEFECT]
                                /  'LOG',                    [l_Kn]

                ◊  NOM_PARA_FONC = npf,

                   ♦  /  VALE_PARA_FONC = lvalef,            [l_R]
                      /  LIST_PARA_FONC = lparaf,            [listr8]

                   ◊  PROL_DROITE_FONC =     /'CONSTANT',
                                             /'LINEAR',
                                             /'EXCLUDED'   ,     [DEFECT]

                   ◊  PROL_GAUCHE_FONC =     /'CONSTANT',
                                             /'LINEAR',
                                             /'EXCLUDED'   ,     [DEFECT]

                   ◊  INTERPOL_FONC =        /  'FLAX',          [DEFECT]
                                             /  'LOG',        [l_Kn]

                ◊  INFORMATION =   /  1,
[DEFECT]
                                   /  2,

                ◊  TITLE =   Ti  ,                           [l_Kn]

             )
```

If F is one formula to 1 parameter, [*] = function,
formula with 2 parameters, tablecloth,
formule_c to 1 parameter, fonction_c,
tablecloth, tablecloth,

```
                function,                       function,
                fonction_c,                     fonction_c.
```

3 Operands

3.1 Operand FUNCTION

♦ FUNCTION = F

Name of FORMULA (interpretable function (FORMULA Cf [U4.31.05])).
This function can be with one or two variables in the case of the real formulas, with a variable only in the case of the complex formulas.

One can however create a new function respectively (fonction_c, tablecloth) starting from a function (respectively fonction_c, tablecloth) by interpolating the first on a different parameter list. This possibility is primarily used in the macro - orders.

When the type as starter is one formula and that NOM_PARA_FONC is provided, the structure of produced data is a tablecloth.

Notice

During the interpolation of a formula with two parameters, one checks coherence between the parameters of the formula and the keywords NOM_PARA and NOM_PARA_FONC. See the example of the paragraph 4.2.

3.2 Operand NOM_RESU

◊ NOM_RESU = NR

Indicate the name of the result, function thus created is a function whose value is of name NR (8 characters).

3.3 Operand NOM_PARA

◊ NOM_PARA = NR

Indicate the name of the parameter of the function or tablecloth. By default, the name of the parameter of the formula or provided function is employed.

3.4 Operands VALE_PARA/LISTE_PARA

◊ / VALE_PARA = lvale,

lvale is the list of the values of the parameter.

/ LIST_PARA = will lpara,

will lpara is the list of the values of the parameter: it is a concept of the type listr8 created previously by the order DEFI_LIST_REEL [U4.34.01].

3.5 Operands PROL_DROITE and PROL_GAUCHE

◊ PROL_DROITE and PROL_GAUCHE =

Define the type of prolongation on the right (on the left) of the field of definition of the parameter of the function or tablecloth

'CONSTANT'	for a prolongation with the last (or first) value of the function,
'LINEAR'	for a prolongation along the first definite segment (PROL_GAUCHE) or last definite segment (PROL_DROITE),
'EXCLUDED'	the extrapolation of the values apart from the field of definition of the parameter is prohibited (in this case if a calculation requires a value of the function out of field of definition, the code will stop in fatal error),

3.6 Operand Interpol

◊ Interpol =

Type of interpolation of the function enters the values of the variable or type of interpolation of the tablecloth between the values of the parameter. Behind this keyword one expects a parameter list (two at the most).

'FLAX': linear,
'LOG': logarithmic curve,

If only one value is given, the interpolation will be identical for the X-coordinates and the ordinates. If two values are given, the first corresponds to the interpolation of the X-coordinates and the second with the interpolation of the ordinates.

3.7 Operand NOM_PARA_FONC

◊ NOM_PARA_FONC = NR

Indicate the name of the variable of the functions defining the tablecloth. When the type as starter is a formula and that this keyword is indicated, then the structure of data produced is a tablecloth.

3.8 Operands VALE_PARA_FONC/LISTE_PARA_FONC

◊ / VALE_PARA_FONC = lvale,

lvale is the list of the values of the variable of the functions defining the tablecloth.

/ LIST_PARA_FONC = will lpara,

will lpara is the list of the values of the variable of the functions defining the tablecloth: it is a concept of the type listr8 created previously by the order DEFI_LIST_REEL [U4.34.01].

3.9 Operands PROL_DROITE_FONC and PROL_GAUCHE_FONC

◊ PROL_DROITE_FONC and PROL_GAUCHE_FONC =

Define the type of prolongation on the right (on the left) of the field of definition of the variable of the functions of the tablecloth:
'CONSTANT', 'LINEAR', 'EXCLUDED' the same direction has as previously.

3.10 Operand INTERPOL_FONC

◊ INTERPOL_FONC =

Type of interpolation of the functions between the values of the variable of the functions defining the tablecloth. Behind this keyword one expects a parameter list (two at the most).

Operation is identical to Interpol.

3.11 Operand INFORMATION

◊ INFORMATION =

Specify the options of impression on the file MESSAGE.

1: pas d' impression (option by default)
2: impression of the parameters plus the list of the first 10 values in the order ascending of the parameter

3.12 Operand TITLE

◊ TITLE = Ti

Title attached to the concept produced by this operator [U4.03.01].

4 Examples

4.1 Case of a function

4.1.1 To define the function FORMULA sin (T)

```
IF = FORMULA (NOM_PARA = 'INST',
              VALE = 'sin (INST) ' )
```

4.1.2 Tabuler sin (T) starting from a list of realities

```
   DEPI   = 2.*pi
   PAS0   = DEPI/200.
   LI1 = DEFI_LIST_REEL (BEGINNING = 0, INTERVALLE=_F (JUSQU_A=DEPI,
PAS=PAS0),)

   SI1 = CALC_FONC_INTERP  (FONCTION= IF, LIST_PARA = LI1, NOM_RESU = 'DEPL',
                            PROL_GAUCHE=' EXCLU', PROL_DROITE=' CONSTANT',
                            INTERPOL=' LIN', TITRE=' FUNCTION SINUS'   )
```

4.1.3 Tabuler sin (T) starting from a list of values

```
   LI2 = (0. , 0.01, 0.03, 0.04, 0.05, 0.06, 0.07, 0.08, 0.09, 0.10)

   SI2 = CALC_FONC_INTERP  (   FUNCTION = IF, VALE_PARA = LI2,
                               NOM_PARA = ' INST',
                               PROL_GAUCHE = 'EXCLUDED', PROL_DROITE =
'EXCLUDED',
                               INTERPOL = 'FLAX', TITLE = 'FUNCTION SINE')
```

4.2 Case of a tablecloth

4.2.1 To define the function FORMULA sin (Omega * T)

```
IF = FORMULA (NOM_PARA = ('FREQ', 'INST'),
              VALE = 'sin (2*pi*FREQ*INST) ')
```

4.2.2 Tabuler sin (Omega * T) starting from a list of moments

The parameter of the tablecloth is 'FREQ', the variable of the functions defining the tablecloth is 'INST'. One checks in CALC_FONC_INTERP that the first parameter of the formula is the same one as NOM_PARA, and that the second parameter of the formula is identical to NOM_PARA_FONC.

```
LI_FREQ   = DEFI_LIST_REEL (BEGINNING = 10, INTERVALLE=_F (JUSQU_A= 100, PAS
=10),)
LI_INST   = DEFI_LIST_REEL (BEGINNING = 0, INTERVALLE=_F (JUSQU_A= 100, PAS
=1),)

 SI1    = CALC_FONC_INTERP  (   FONCTION= IF,
                                NOM_RESU = 'DEPL',
                                NOM_PARA_FONC=' INST',
                               LIST_PARA_FONC = LI_INST
                                PROL_GAUCHE_FONC=' EXCLU',
                                PROL_DROITE_FONC=' CONSTANT',
                                INTERPOL_FONC=' LIN',
                                NOM_PARA=' FREQ',
```

```
LIST_PARA = LI_FREQ
PROL_GAUCHE=' LINEAIRE',
PROL_DROITE=' LINEAIRE',
INTERPOL=' LIN',
TITRE=' FUNCTION SINUS',)
```