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


◊ 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’,
            /‘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’,
                 /‘LOG’ ,       [l_Kn]
◊ INFORMATION = / 1,
               / 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,
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.
  / **LISTE_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 DEF 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 $\sin (T)$

$$\text{IF} = \text{FORMULA} \left( \text{NOM\_PARA} = \text{‘INST’}, \right.$$  
$$\left. \text{VALE} = \text{‘} \sin (\text{INST}) \text{’} \right)$$

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

$$\text{DEPI} = 2.\pi \text{ DEPI}/200.$$  
$$\text{PAS}0 = \text{DEPI}/200.$$  
$$\text{LI1} = \text{DEFI\_LIST\_REEL} \left( \text{BEGINNING} = 0, \text{INTERVALLE} = \_F \left( \text{JUSQU\_A} = \text{DEPI}, \text{PAS} = \text{PAS}0 \right) \right)$$

$$\text{SI1} = \text{CALC\_FONC\_INTERP} \left( \text{FONCTION} = \text{IF}, \text{LIST\_PARA} = \text{LI1}, \text{NOM\_RESU} = \text{‘DEPL’}, \right.$$  
$$\left. \text{PROL\_GAUCHE} = \text{‘EXCLU’}, \text{PROL\_DROITE} = \text{‘CONSTANT’}, \right.$$  
$$\left. \text{INTERPOL} = \text{‘LIN’}, \text{TITRE} = \text{‘FUNCTION SINUS’} \right)$$

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

$$\text{LI2} = \left( 0.0, 0.01, 0.03, 0.04, 0.05, 0.06, 0.07, 0.08, 0.09, 0.10 \right)$$

$$\text{SI2} = \text{CALC\_FONC\_INTERP} \left( \text{FUNCTION} = \text{IF}, \text{VALE\_PARA} = \text{LI2}, \right.$$  
$$\left. \text{NOM\_PARA} = \text{‘INST’}, \right.$$  
$$\left. \text{PROL\_GAUCHE} = \text{‘EXCLUDED’}, \text{PROL\_DROITE} = \text{‘EXCLUDED’}, \right.$$  
$$\left. \text{INTERPOL} = \text{‘FLAX’}, \text{TITLE} = \text{‘FUNCTION SINE’} \right)$$

4.2 Case of a tablecloth

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

$$\text{IF} = \text{FORMULA} \left( \text{NOM\_PARA} = \left( \text{‘FREQ’}, \text{‘INST’} \right), \right.$$  
$$\left. \text{VALE} = \text{‘} \sin (2.\pi*\text{FREQ}^*\text{INST}) \text{’} \right)$$

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.

$$\text{LI\_FREQ} = \text{DEFI\_LIST\_REEL} \left( \text{BEGINNING} = 10, \text{INTERVALLE} = \_F \left( \text{JUSQU\_A} = 100, \text{PAS} = 10 \right) \right)$$

$$\text{SI1} = \text{CALC\_FONC\_INTERP} \left( \text{FUNCTION} = \text{IF}, \right.$$  
$$\left. \text{NOM\_RESU} = \text{‘DEPL’}, \right.$$  
$$\left. \text{NOM\_PARA\_FONC} = \text{‘INST’}, \right.$$  
$$\left. \text{LIST\_PARA\_FONC} = \text{LI\_INST} \right.$$  
$$\left. \text{PROL\_GAUCHE\_FONC} = \text{‘EXCLU’}, \right.$$  
$$\left. \text{PROL\_DROITE\_FONC} = \text{‘CONSTANT’}, \right.$$  
$$\left. \text{INTERPOL\_FONC} = \text{‘LIN’}, \right.$$  
$$\left. \text{NOM\_PARA} = \text{‘FREQ’}, \right.$$
LIST_PARA = LI_FREQ
PROL_GAUCHE=' LINEAIRE',
PROL_DROITE=' LINEAIRE',
INTERPOL=' LIN',
TITRE=' FUNCTION SINUS', )