

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,

Code_Aster

Version
default

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```
function,  
fonction_c,
```

```
function,  
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',)
```