Operator IMPR_FONCTION

1 Goal

To print the contents of objects of type function or list of realities in a file intended for a graph plotter.

Note: Tables, they, are printed with the order IMPR_TABLE.

2 Syntax

```
IMPR_FONCTION (
        ◊  FORMAT  =     /  'TABLE',                              [DEFECT]
                         /  'XMGRACE',
                         /  'AGRAF',

    # Definition of the logical unit to the format AGRAF

        ◊  UNIT =     /  links,                                   [I]
                      /  25,                                         [DEFECT]
        ◊  UNITE_DIGR = /  unit_digr,                             [I]
                      /  26,                                         [DEFECT]

    # Definition of the logical unit to the format XMGRACE and of the pilot of
    impression

        ◊  UNIT =     /  links,                                   [I]
                      /  29,                                         [DEFECT]
        ◊  PILOT =       /  '',                                   [DEFECT]
                         /  'POSTSCRIPT',                         [KN]
                         /  'EPS',
                         /  'MIF',
                         /  'SVG',
                         /  'PNM',
                         /  'PNG',
                         /  'JPEG',
                         /  'Pdf',
                         /  'INTERACTIVE',

    # Definition of the logical unit to the format TABLE

        ◊  UNIT =     /  links,                                   [I]
                      /  8,                                          [DEFECT]

    # graphic Page layout common to XMGRACE and AGRAF
        ◊  BORNE_X = (xmin, xmax),                                [l_R]
        ◊  BORNE_Y = (ymin, ymax),                                [l_R]
        ◊  ECHELLE_X =  /  'FLAX',
    [DEFECT]
                        /  'LOG',
        ◊  ECHELLE_Y =  /  'FLAX',
    [DEFECT]
                        /  'LOG',
        ◊  GRILLE_X  =  /  0,                                        [DEFECT]
                        /  nx,                                       [R]
        ◊  GRILLE_Y  =  /  0,                                        [DEFECT]
                        /  ny,                                       [R]
        ◊  LEGENDE_X =  xlegen ,                                     [KN]
        ◊  LEGENDE_Y =  ylegen ,                                     [KN]

    # Page layout of the table

        ◊  SEPARATOR =     /  separ,                                 [DEFECT]
                           /  '',                                [KN]
        ◊  COMMENT =    /  COM,                                  [KN]
```

```
                        /   '#',                                    [DEFECT]
      ◊  COMM_PARA =    /   comp,                                   [KN]
                        /   '',                                     [DEFECT]
      ◊  DEBUT_LIGNE =  /   deb.,                                   [KN]
                        /   '',                                     [DEFECT]
      ◊  FIN_LIGNE =    /   end,                                    [KN]
                        /   '\,                                   [DEFECT]



# Commun runs with all the formats

   ◊  TITLE        =  title,                                        [KN]
   ◊  SOUS_TITRE   =  sous_titre,                                   [KN]
   ◊  INFORMATION        =  / 1,
   [DEFECT]
                         / 2,


# Definition of the function to be traced

   ♦  CURVE = ( _F(

      # Put in the form of the function at the formats XMGRACE and AGRAF

            ◊  LEGEND =   legend,                                 [KN]

            ◊  STYLE =      sty,                                     [I]

            ◊  COLOR =      coul,                                    [I]

            ◊  MARKER =  marq,                                    [I]

            ◊  FREQ_MARQUEUR =  freqmarq,                            [I]

      # Recovery of the function to be traced

            ♦  /  ♦  FUNCTION  =  Fr,                             [function]
                  ◊  LIST_PARA = will lpara,                         [listr8]

               /  ♦  FUNCTION  =  FC,                             [fonction_C]
                  ◊  PART    = /  'REAL',
                                /  'IMAG',
                  ◊  LIST_PARA = will lpara,                         [listr8]

               /  ♦  FONC_X    =  fx,                             [function]
                  ♦  FONC_Y    =  fy,                             [function]
                  ◊  LIST_PARA =  will lpara,
   [listr8]

               /  ♦  LIST_PARA =  will lpara,
   [listr8]
                  ♦  LIST_RESU =  lresu,                          [listr8]

               /  ♦  X-COORDINATE  = labs,                           [l_R]
                  ♦  ORDINATE  =  lordo,                          [l_R]

      # Tri possible

            ◊  SORTING = /   '   ,                                   [DEFECT]
                         /   'X',
                         /   'Y',
                         /   'XY',
                         /   'YX',
```

```
    ),),
)
```

3 Operands

3.1 Presentation of the curves

A set of operands optional makes it possible to define the presentation of the curve. All have a value by default.

3.1.1 Operand FORMAT

◊ FORMAT =

Format of impression of the function

'AGRAF' impression intended for the software agraf, which also makes it possible to adapt the parameters of presentation in interactive,

'TABLE' the impression in columns makes it possible to easily import the data in a spreadsheet, if one gives several curves, it is the list of the X-coordinates of the first function which is used to interpolate the values of the other functions,

'XMGRACE' impression intended for the software xmgrace. One can also adapt the parameters of presentation in interactive. The use of the keyword PILOT allows to directly produce a file image or postscript.

Notice

The format XMGRACE is intended for versions 5 of grace and is not compatible with grace6 (version 5.99).

3.1.2 Operand UNIT

◊ UNIT = links

◊ UNITE_DIGR = unit_digr if FORMAT = 'AGRAF'

Allow to choose on which logical unit one prints the functions. The value of links must be the same one as in the interface astk.

If many curves are plotted, it is more flexible to use the type repe compound with the order DEFI_FICHIER, the files will be in the repertoire ./REPE_OUT.

With the format AGRAF, the data are written in UNIT whereas the directives are written in UNITE_DIGR (26 by defaults are worth).

The value by default of links is worth:

- 8 with the format TABLE (corresponds to the file result),
- 25 with the format AGRAF,
- 29 with the format XMGRACE (optional if PILOT = 'INTERACTIF')

3.1.3 Operand PILOT

While choosing FORMAT = 'XMGRACE', one has the pilots of exit used by xmgrace by using the keyword PILOT. This amounts using the functions of export of xmgrace via its menu "/Print Setup Slips by…".
The exact list of the pilots available on your waiter is provided by the option "- version" of xmgrace.

Possible values of PILOT :

''	:	in this case, no pilot is used, the file obtained is it .agr or .dat of xmgrace (file containing the data and the directives of the graph.
'POSTSCRIPT', 'EPS'	:	file postscript full-page or encapsulated,
'PNG', 'JPEG', 'PNM'	:	file of type image,
'PDF', 'MIF', 'SVG'	:	particular formats,
'INTERACTIVE'	:	no file is turned over if one can open xmgrace with the

screen.

3.1.4 Page layout of the graph common to XMGRACE and AGRAF

3.1.4.1 Operands BORNE_X / BORNE_Y

◊ BORNE_X =

Layout of the function in an interval of the X-coordinates given.

◊ BORNE_Y =

Layout of the function in an interval of the ordinates given.

3.1.4.2 Operands ECHELLE_X / ECHELLE_Y

◊ ECHELLE_X =

Type of scale desired for the X-coordinates, FLAXéaire or LOGarithmic.

◊ ECHELLE_Y =

Type of scale desired for the ordinates, FLAXéaire or LOGarithmic.

3.1.4.3 Operands LEGENDE_X / LEGENDE_Y

◊ LEGENDE_X =

Legend associated with the x-axis.

◊ LEGENDE_Y =

Legend associated with the y-axis.

3.1.4.4 Operands GRILLE_X / GRILLE_Y

◊ GRILLE_X = nx

For xmgrace, nx is the distance between two vertical successive lines of the grid.
For agraf, nx is the entirety defining the frequency of layout of these lines.

◊ GRILLE_Y = ny

Even thing for the horizontal lines of the grid.

3.1.5 Page layout with the format TABLE

VoiR IMPR_TABLE [U4.91.03] for the description of the keywords of working (DEBUT_LIGNE, COMMENT...).

Note:

The labels of the columns are suffixées by "_+ n° of column" (while starting to 0) in order to avoid the repetition because the names all of columns must be different.

3.1.6 Keywords common to all the formats

◊ TITLE
◊ SOUS_TITRE

Allow to define the principal and secondary titles graph or table.

3.2 Keyword CURVE

♦ CURVE

Keyword factor allowing to print the definite functions or to trace one or more functions in the same graph (a function by occurrence of the keyword factor).

3.2.1 Complementary attributes for the layout of each function by the software xmgrace or agraf

◊ STYLE = sty

This keyword defines the style of feature of the curve.

For xmgrace, the correspondence is the following one:
0 step of line 1 continuous feature 2 dotted lines 3 short indents 4 long indents
5,6,7,8 alternate indents dotted lines

For agraf, the styles are:
0 line 1 dotted lines 2 point

◊ MARKER = marq

This keyword defines the type of marker or symbol of the points of the curve.

For xmgrace :
0 step of marker 1 circle 2 square 3 rhombus 4 high triangle
5 left triangle 6 low triangle 7 right triangle 8 more 9 crosses
10 star

For agraf, the markers are:
0 circle 1 square 2 more 3 rhombus 4 rings full
5 full square 6 full rhombus 7 cercle+croix 8 losange+croix

◊ COLOR = coul

This keyword defines the color of the curve.

For xmgrace, the colors are:
0 white 1 black 2 red 3 green 4 blue
5 yellow 6 brown 7 gray 8 purple 9 cyan
10 magenta 11 orange 12 chestnut 13 indigo 14 turquoise
15 dark green

For agraf, the colors are:
0 black 1 red 2 dark green 3 blue 4 magenta
5 cyan 6 green 7 chestnut 8 orange 9 mauve
10 yellow 11 clear chestnut

◊ LEGEND = legend

Legend given to the function (by default one recovers the name of the function).

◊ FREQ_MARQUEUR = freqmarq

Entirety indicating the frequency of impression of the marker associated with a function. All them freqmarq points of discretization of the function, a marker is printed (by default all points).

3.2.2 Additional attributes for the layout by the software agraf

◊ SORTING = tr

This keyword makes it possible to sort by order ascending the parameters defining the function:

- tr = 'NR', pas de sorting,
- tr = 'X', sorting of the points of the function according to the order ascending of X-coordinates X,
- tr = 'Y', sorting of the points of the function according to the order ascending of the ordinates there,
- tr = 'XY', sorting of the points of the function according to the order ascending of X-coordinates X and in the event of equality according to the order ascending of the ordinates,
- tr = 'YX', sorting of the points of the function according to the order ascending of the ordinates there and in the event of equality according to the order ascending of the X-coordinates,

3.2.3 Impression or layout of a real function

/ ♦ FUNCTION = Fr

Name of the real function to print or trace.

◊ LIST_PARA = Lr

Impression or layout of the function according to the list of the parameters given.

3.2.4 Impression or layout of a complex function

One trace either the real part, or the imaginary part. If one wants to trace the real part and the imaginary part in the same graph, the keyword factor should be repeated CURVE.

/ FUNCTION = FC

Name of the function complexes to print or trace.

◊ PART =

Impression or layout of the part REALITYor IMAGinaire.

◊ LIST_PARA = Lr

Impression or layout of the function according to the list of the parameters given.
Without effect during an impression in column (format 'TABLE').

3.2.5 Impression or layout of a function defined by 2 lists of realities

/ ♦ LIST_PARA = will lpara

Name of the list of the X-coordinates.

♦ LIST_RESU = lresu

Name of the list of the ordinates.

Or:

/ ♦ X-COORDINATE = labs

List python of the X-coordinates.

♦ ORDINATE = lordo

List python of the ordinates.

3.2.6 Impression or layout of a parametric function

/ ♦ FONC_X = fx

Name of the parametric function X = F (T) to print or trace.

♦ FONC_Y = fy

Name of the parametric function there = G (T) to print or trace.

◊ LIST_PARA = Lr

Impression or layout of the function according to the list of the parameters given.

3.2.7 Features which existed in **IMPR_COURBE**

Working of the graphs starting from table from now on is ensured by IMPR_TABLE.

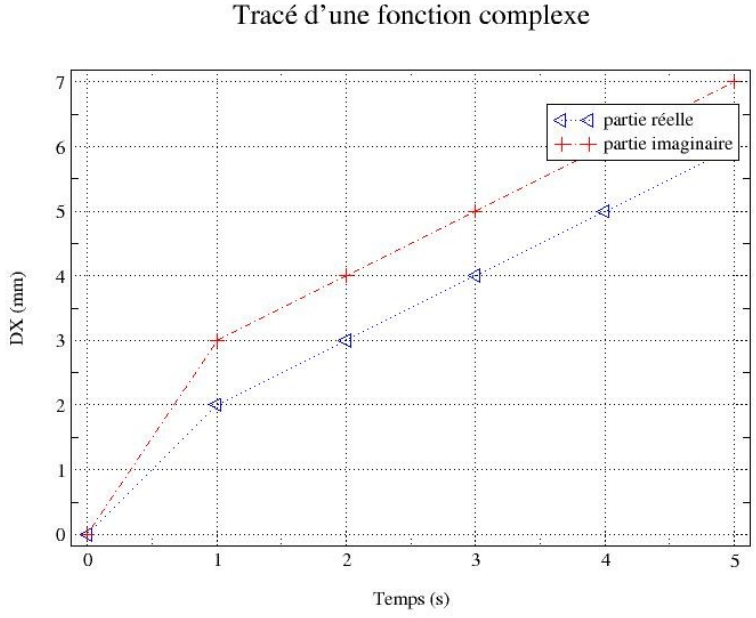
The layout of one resu_gene in a node of shock must be made in two times: to recover a function with RECU_FONCTION, keyword RESU_GENE, then to print the graph with IMPR_FONCTION.

4 Examples

4.1 Curve representing a complex function

```
FC = DEFI_FONCTION (NOM_PARA=' INST', NOM_RESU=' DX',
                    VALE_C= (0. , 0. , 0. , 1. , 2. , 3. ,
                             2. , 3. , 4. , 3. , 4. , 5. ,
                             4. , 5. , 6. , 5. , 6. , 7. ),)

IMPR_FONCTION (
   UNIT     = 24,
   FORMAT    = 'XMGRACE',
   PILOT    = 'POSTSCRIPT',
   LEGENDE_X = 'Time (S)',
   LEGENDE_Y = 'DX (mm)',
   CURVE    = (
      _F (FUNCTION = FC,
          PART   = 'REAL',
          COLOR  = 4,
          STYLE    = 2,
          MARKER = 5,
          LEGEND  = 'real part',),
      _F (FUNCTION = FC,
          PART   = 'IMAG',
          COLOR  = 2,
          STYLE    = 5,
          MARKER = 8,
          LEGEND  = 'imaginary part',),
   ),
   TITLE     = "Traced of a complex function",
)
```



4.2 Parametric curve

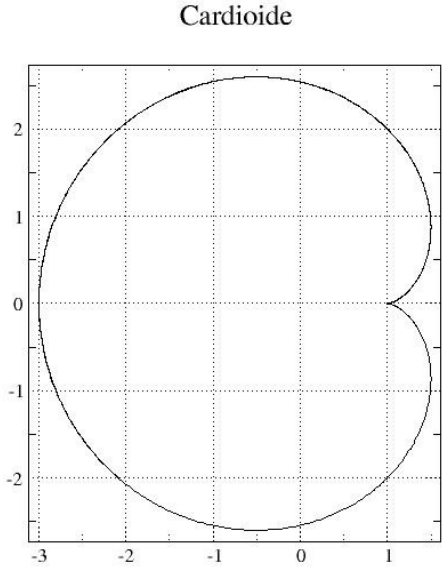
```
lt = DEFI_LIST_REEL (BEGINNING = 0. , INTERVALLE=_F (JUSQU_A=10.,
PAS=0.01),)

fx = FORMULA (NOM_PARA=' you,
              VALE= """ 2.*cos (T) - cos (2.*t) """,)
cardioX=CALC_FONC_INTERP (
              FUNCTION  = fx,
              LIST_PARA = lt,)

fy = FORMULA (NOM_PARA=' you,
              VALE= """ 2.*sin (T) - sin (2.*t) """,)
cardioY=CALC_FONC_INTERP (
              FUNCTION  = fy,
              LIST_PARA = lt,)

IMPR_FONCTION (
   UNIT    = 27,
   FORMAT   = 'XMGRACE',
   TITLE    = 'Ardioid',
   CURVE   = (
      _F (FONC_X = cardioX,
          FONC_Y = cardioY,),
   ),
)
```

A file thus is obtained that one can visualize in `xmgrace` :



Additional working in `xmgrace` : menu *Stud/Graph appearance*, type *fixed* (square grid), and to remove the legend by stripping the box *Display legend*.