

## Note of use of Grace for Code\_Aster

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### Summary:

This document presents the graphic tool of layout of curves Grace, tool powerful to plot and handle curves produced by Code\_Aster.

## 1 General information

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### 1.1 Grace presentation

Grace is a tool of graphic layout of curve (WYSIWYG) under licence LPG available on the system standard Unix/Linux and related to other platforms (of which Windows). The strong points of Grace are the following:

- modification of the layouts in a graphic environment by contextual menu;
- very precise control of the elements on the curves (traced, legends, axes, etc...);
- re-examined quality "publication";
- export (E) PS, pdf, JPG, PNG (according to platform and installation);

The website of Grace is <http://plasma-gate.weizmann.ac.il/Grace>

### 1.2 Object of this tutorial

The goal of this tutorial is to make it possible to the user of Aster to rather quickly take over a powerful tool enabling him to plot curves.

This tutorial presents the two great stages to plot the curves:

- to import and modify the data;
- to specify the graphic aspects of the curves.

### 1.3 Other information sources

Only basic handling will be presented here; for a more precise description of the features of Grace, the reader will refer to the user guide (in English): <http://plasma-gate.weizmann.ac.il/Grace/doc/UsersGuide.html>

A FAQ is diponible on the site of Grace: <http://plasma-gate.weizmann.ac.il/Grace/doc/FAQ.html>

## 2 Creation/importation of data

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This paragraph describes the part "given" of Grace. There are three ways of obtaining data to be traced in Grace:

- by importation of data in files;
- by creation of data (via sampled mathematical functions);
- by duplication and modification of existing data.

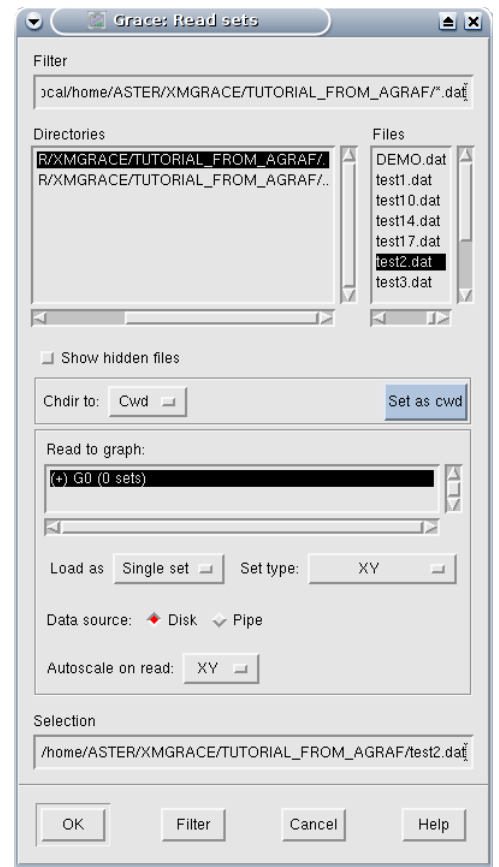
### 2.1 Importation

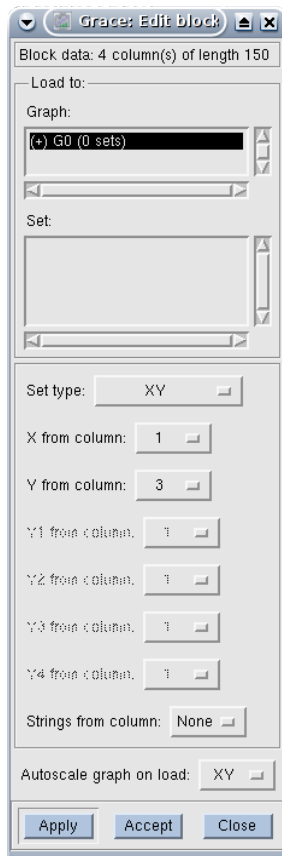
Grace is able to import curves starting from textual files. These files should contain only data (except for lines starting with # which are regarded as lines of comments).

The data must be in column (separated by spaces or tabulation characters). Attention, a file can contain one "", i.e storage block of the data on several columns and several lines (contrary to the files .dogr previously used by the Agraf tool).

Grace can read the various columns in the form:

- only one curve ('individual set'): XY, Grace takes column 1 for X and column 2 for there; or a curve XYDX, Grace then takes X in column 1, there in the column 2 and dx (uncertainty on X) in column 3; multiple types of curves are envisaged;
- several curves which shares the same X-coordinates ('NXY'): column 1 contains the X-coordinates common to all the curves; the columns (i+1) contain the ordinates of the curve (i).
- several curves with potentially different X-coordinates ('block dated'): an interface opens to define the number of the column where X-coordinates or ordinates of each curve are arranged - an entry 'index' makes it possible of more than define a curve ((1, y1), (2, y2),..., (N, yn)) -.





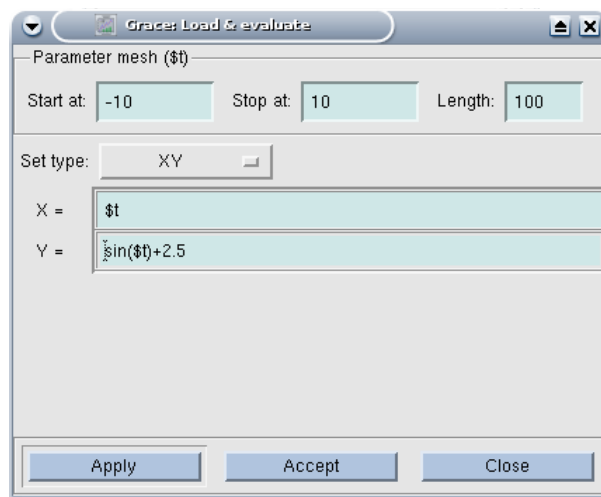
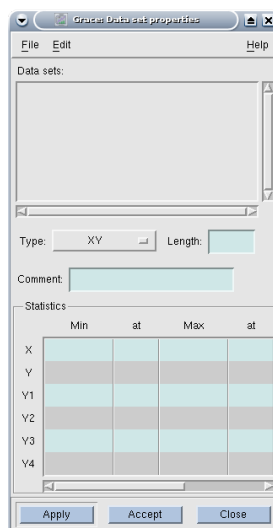
In practice, the importation is done starting from the menu "Dated/ASCII Importation/...", which opens the window of dialogue above. One notes:

- the part "selector of file" in top;
- the possibility of sending the data imported on the graph of its choice (cf further the organization from Grace in graphs and curves): "Read to graph"
- selection of the type of importation ("Load ace" and "Standard set"). In the case of an importation in the form of "block dated", after validation by "ok", Grace analyzes the file and a new window opens which makes it possible to affect the various columns. It will be noticed that at the top of this window, Grace indicates the number of columns and lines which it found in the file. It will be also noted that one can define the type of the curve by 'standard Set'. Lastly, the difference between the button "apply" and "accept" is interesting to know: "apply" load the curve by leaving the open dialog box (to be used if the user has several curves to import of the same file), while "accept" load the curve and firm the dialog box (to be used for the importation of only one curve starting from the same file).

## 2.2 Creation of data per mathematical function

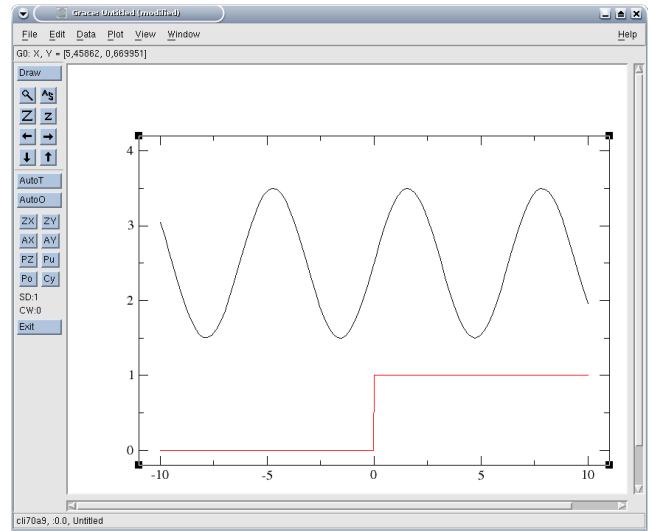
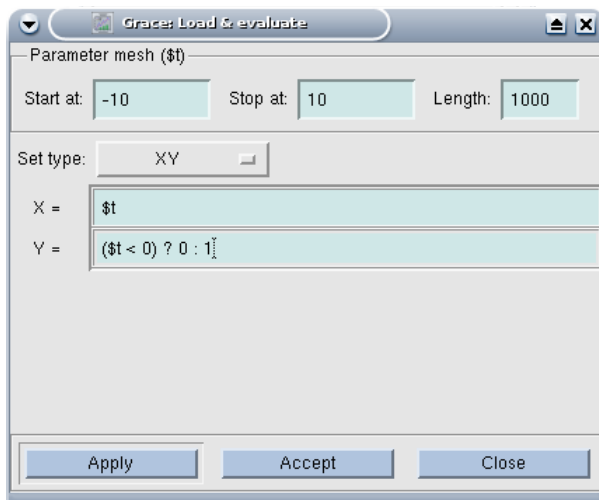
To define a curve, should be connected the following orders:

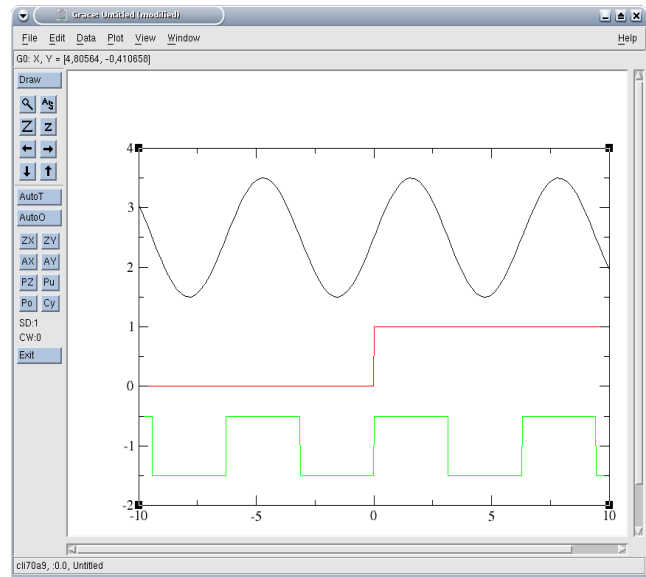
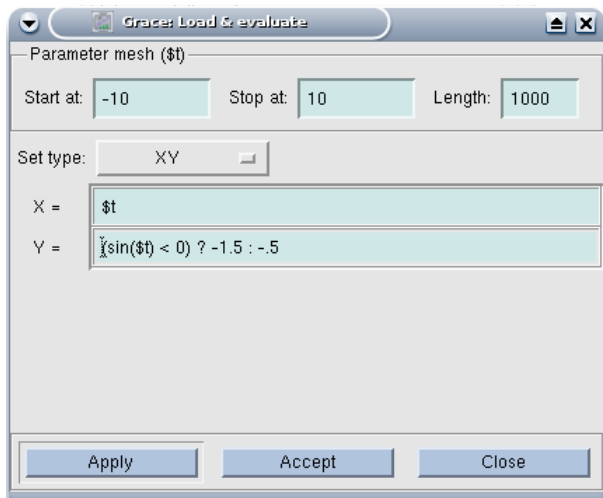
- Edict/Dated sets...
  - Right click in the zone below "Dated sets";
  - To choose "Create New/By Formula", which opens limps it following, that it is necessary to fill.
- For example, to trace  $\sin(X) + 2.5$  from -10 to 10 in 100 pas;



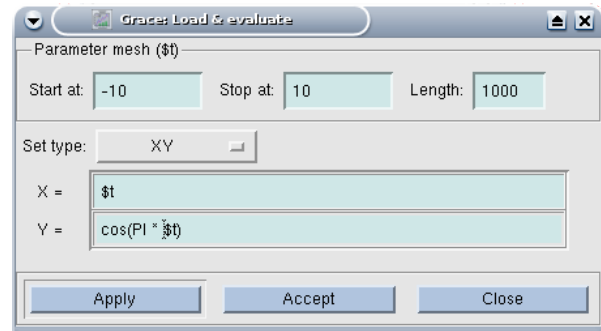
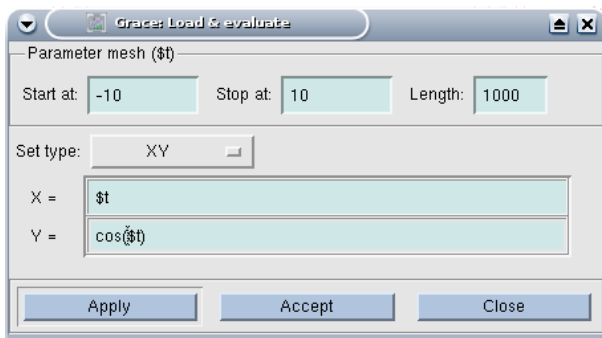
- After "Accept" then "Closed", possibly button "Autoscale" (tool (see paragraph [§5] detailing the bar of tool of Grace) "ACE" on the right of the magnifying glass of the zoom) to display the curve on the good scale.

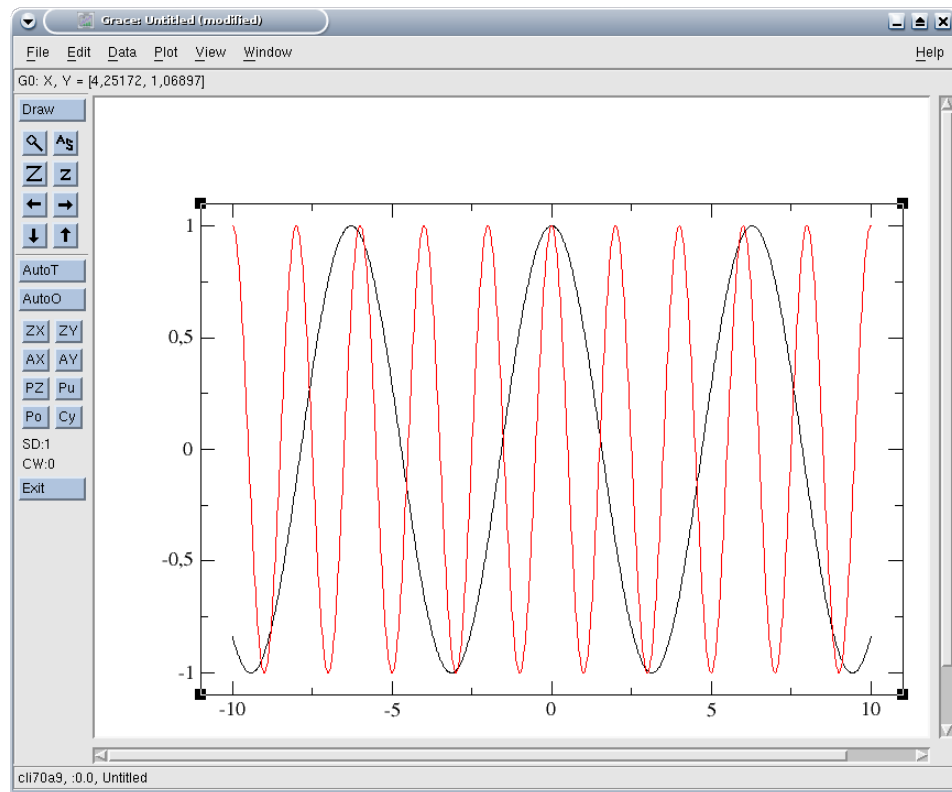
One can also use tests (use of the characters "?" equivalent of a "then" and ":" equivalent of a "else") in the formulas, as on the following examples:





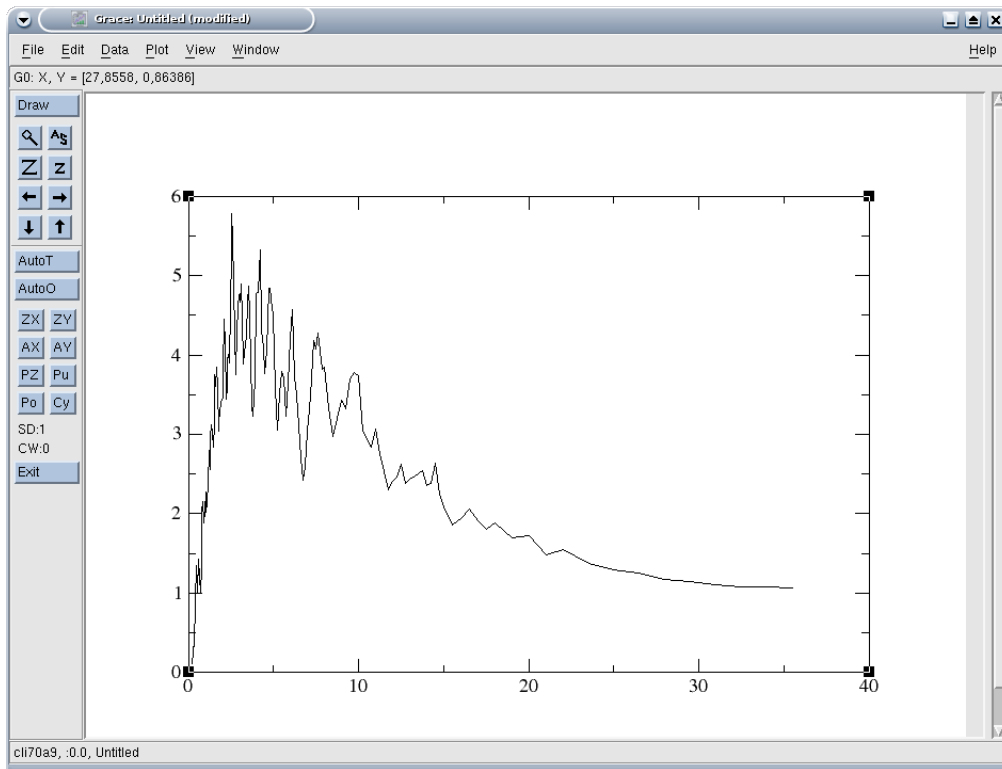
One can also use symbol pi:





## 2.3 Duplication and modification of existing data

Let us suppose that Grace has already the following curve:





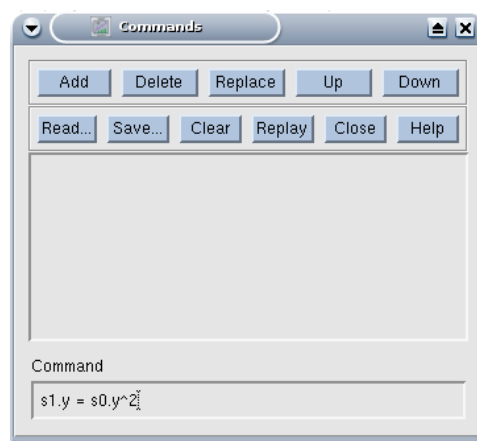
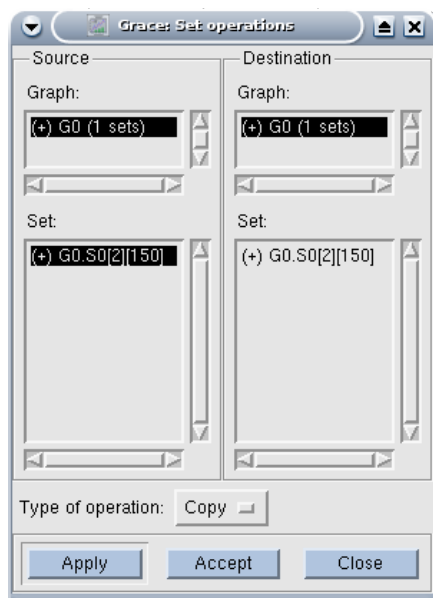
To duplicate/modify a curve, there are two solutions. Some it is the adopted solution is necessary to open the operator console. With the first solution, one starts by duplicating the curve to modify it in the operator console; with the second, all is done in the operator console.

## 2.3.1 Duplication then modification in the console

It is supposed that there is at least a curve available in Grace.

The sequence of orders is the following:

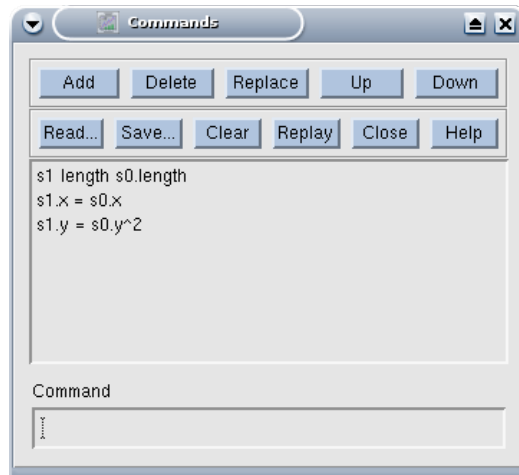
- Edict/Set Operations,
- to select G0 like graph to be copied, S0 like curve to be copied and G0 like graph of destination and "Copy" like operation to be carried out, finally "accept",
- it is now necessary to modify the column Y of the set S1; that is done by opening the operator console: Window/Commands, and to type "s1.y = s0.y^2" to obtain the preceding curve squared (cf [§5.4] of User' S Guides for a complete listing of the authorized operations).



## 2.3.2 creation in the console

One opens the operator console immediately: Window/Commands.

- One creates initially the curve by specifying the number of points (identical to the number of points of the set S0) "s1 length s0.length",
- then one duplicates the X-coordinates "s1.x = s0.x",
- finally one defines the ordinates "s1.y = s0.y^2"



## 3 Organization of Grace in graphs and curves

### 3.1 General information

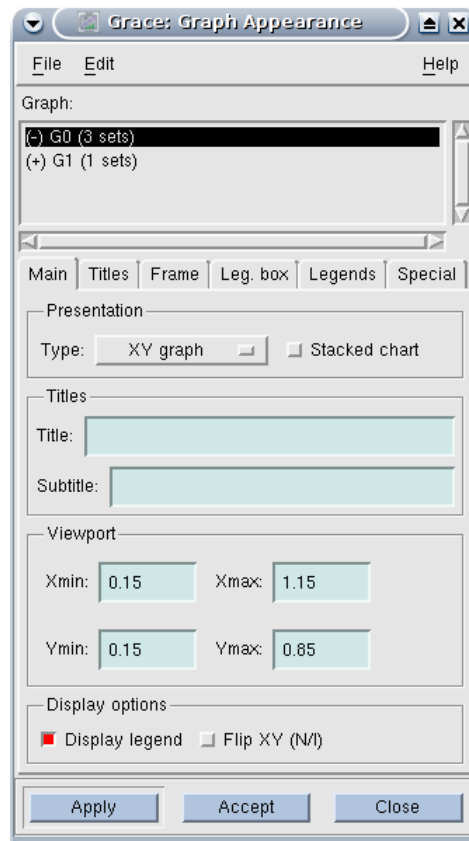
For Grace, a graph is a graph which can contain several curves, a "project" Grace (being able to be saved in a file carrying the extension "agr") can contain several graphs.

The graphs are named G0, G1,...

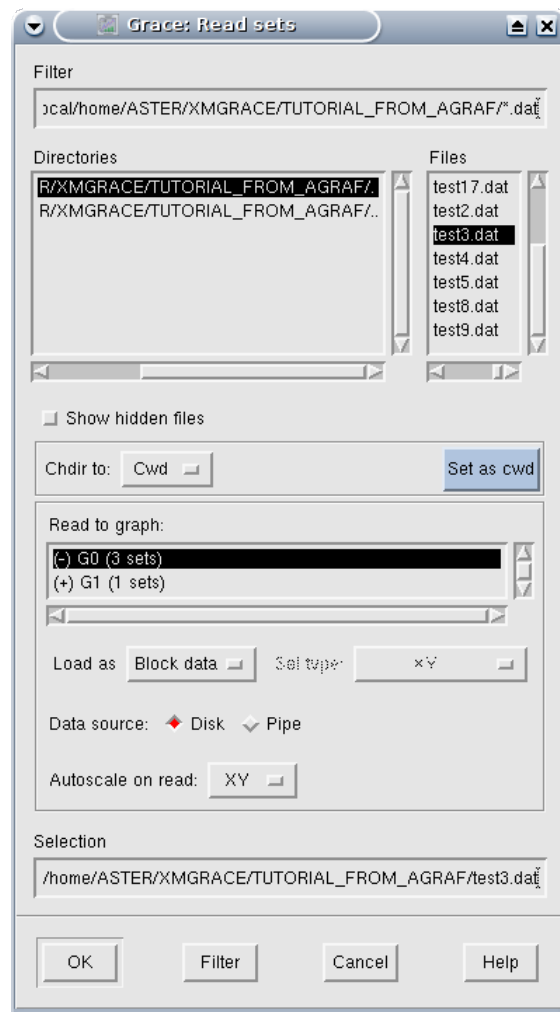
The curves are named S0, S1,...

### 3.2 Management of the graphs

The user can manage the graphs in each list of selection of graphs (for example in the menus Edict/Arranges Graphs, Edict/Set Operations, Edict/Overlay Graphs, Stud/Appearance Graph as on the illustration below or Dated/ASCII Importation/).



In the zone below “Graph”, one finds a list of graphs here (, the project comprises two graphs, the first including three curve, the second including only one curve). One will note it “(-)” in front of the first graph, which means that the first graph “is hidden” (hidden, i.e not displayed), while it (+) in front of the second means that it is displayed (showed). The graphs put in intensified brightness are the graphs concerned with the action in progress: here, the modification of the graph relates to G0 (even if it is hidden!). In the same way, with the importation of a curve:



the curve which the user prepares to import will go in the G0 graph (like previously, this graph being hidden, the imported curve will not be displayed).

In certain menus (Stud/Appearance Graph for example), it is possible to select several graphs (in a usual way: Left Ctrl + click for a selection of graph "one by one" or left Shift + click on the first and last element of a contiguous list or left click + displacement of the mouse on a list....), while other menus (Dated/ASCII Importation/for example) authorizes one selected graph.

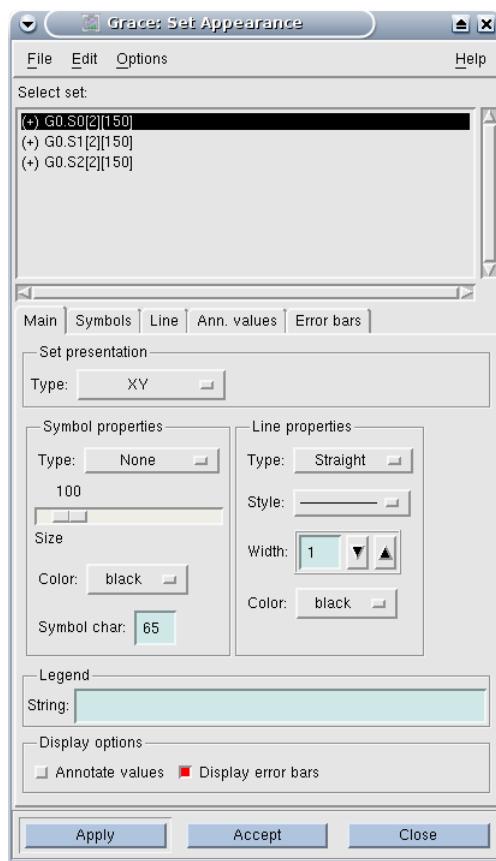
An order important (and not very intuitive) is the right click on the list of the graphs, which opens a menu comprising the following orders:

- focus to: to define the active graph (useful if several graphs are displayed: the active graph is that which receives the actions when the user uses the icons, in the same way to manage the curves of a graph, it is necessary that the graph is the active graph);
- hide: hide the graph;
- show: poster the graph;
- duplicate: duplicate the graph and all its curves;
- bottle: destroyed the graph;
- swap: exchange two graphs (one needs two graphs placed in intensified brightness);
- create new: create a new graph (vacuum).

In short, to create a new graph, it is necessary to open the list of the graphs (by using for example Stud/Appearance Graph), to click on the right on the list of the graphs and to choose "Create New". It will be noted that there does not exist menu making it possible to make this action directly.

## 3.3 Management of the curves

The principle of management of the curves is about the same one as that concerning the graphs. Grace displays the list of the curves (active graph: attention, once again, the active graph is not inevitably visible!) in the menus which handles the curves: Edict/Dated Sets, Edict/Set Operations, Dated/Dated set operations, Stud/Set Appearance as on the following illustration:



The active graph is G0 here (he is recalled in prefix of the curves in the list), he has three curves (one will note the mention, between hook, behind the name of the curves of dimension – here 2 for X and Y – and length – here, the curves have all 150 points -).

In the list of the curves, right click opens a menu:

- hide: hiding place the curve;
- show: poster the curve;
- bring to face: mets the curve with the foreground;
- send to back: mets the curve with the background;
- duplicate: duplicate the curve;
- bottle: remove the curve;
- bottle dated: remove the data but not the curve, i.e all working is preserved, which can be very practical if the user has two identical graphs to realize starting from different data: it is enough to create a graph, then to remove all the data with “bottle dated”, to import the second set of data: the two graphs will have the same aspect exactly;
- swap: exchange the position of the two curves
- edict: publish the data;
- create new: create a new curve;
- pack all sets: ?
- selector operations: left preferably menu for the posting of this list of curves.

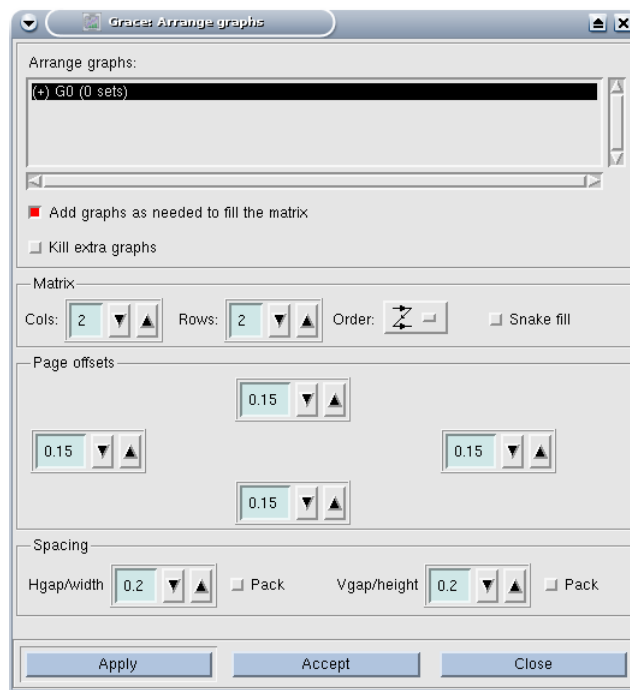
Note:

All the preceding operations on the curves are done inside the same graph. If the user would need to copy a curve of a graph from another, it is necessary to use the small Edict/Set Operations.

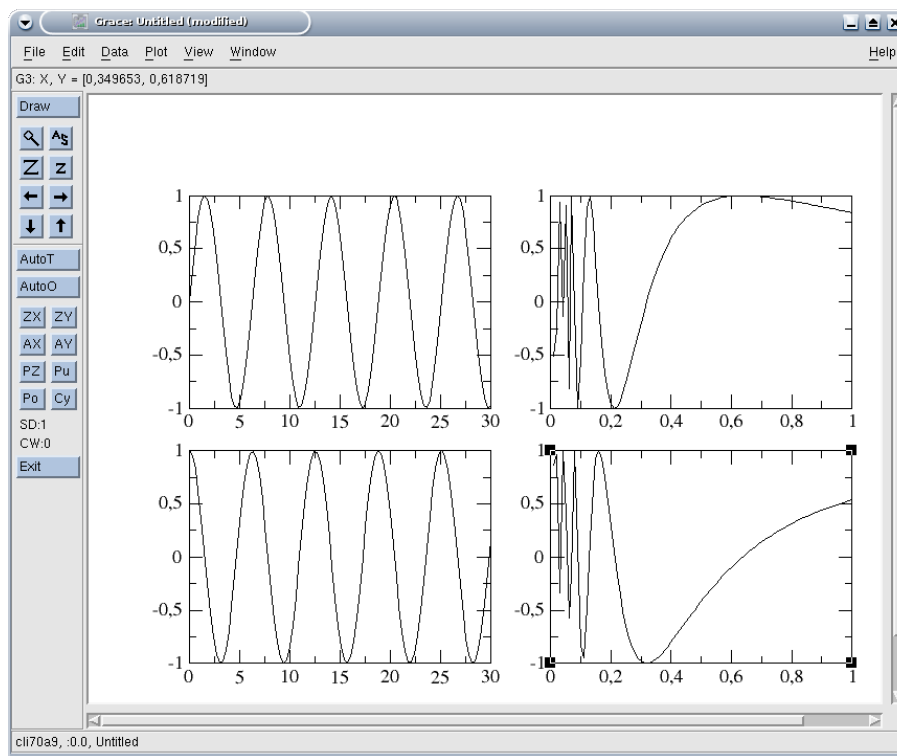
## 4 Working of the graphs and the curves

### 4.1 Provision of graphs on a page

Grace makes it possible to display several graphs on a page. The menu which manages this function is Edict/Arranges Graphs:



The choices above indicate to trace a matrix of (2x2) graphs (more of the options concerning the order of classification of the graphs and the various margins), which makes it possible to obtain a page of the form:

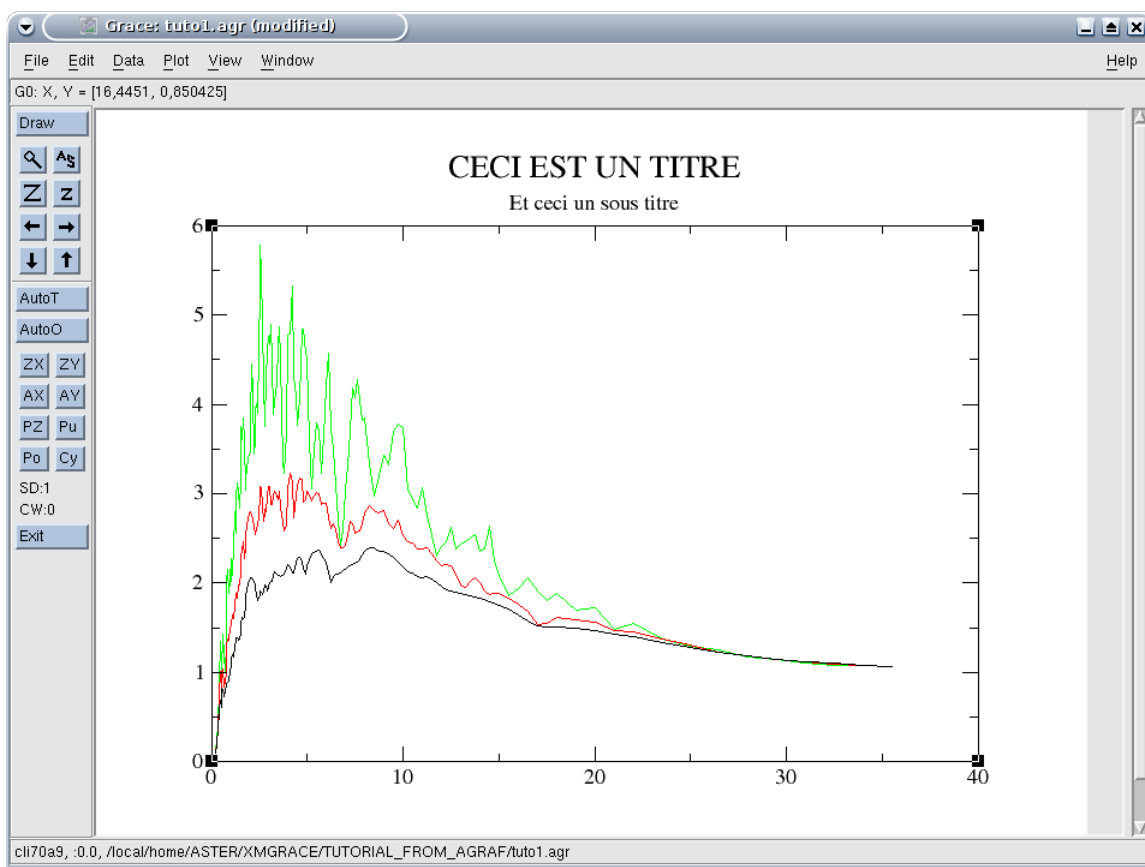
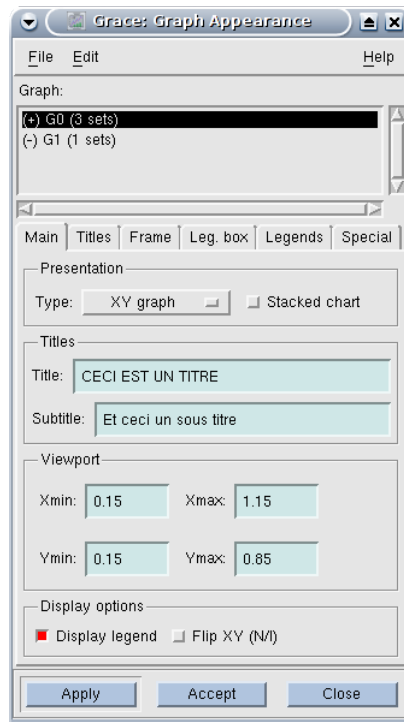


## 4.2 Working of the graphs

The small Stud/Appearance Graph makes it possible to define working of the graphs, i.e all workings common to all the curves of the graph, out the definition of the axes, which is accessible by Stud/Properties Axis.

One is satisfied here with a description summary, for more advanced functions, simplest is undoubtedly to directly traverse the mitres of the window of dialogue of Stud/Appearance Graph.

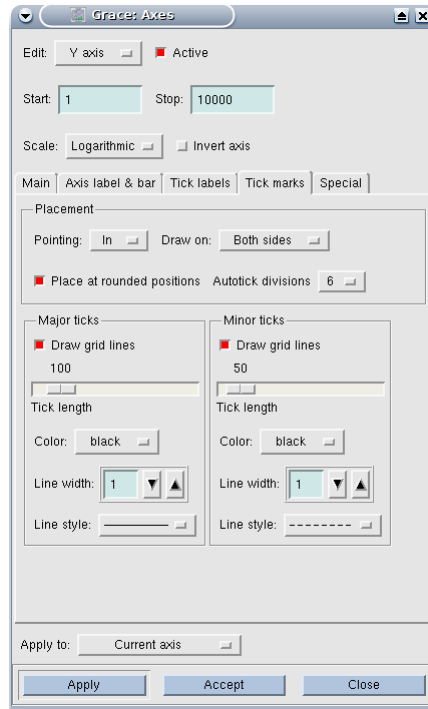
To put a title at a graph, the text of the title is to be put in the mitre Hand, the size of the characters being able to be regulated in the Title mitre.

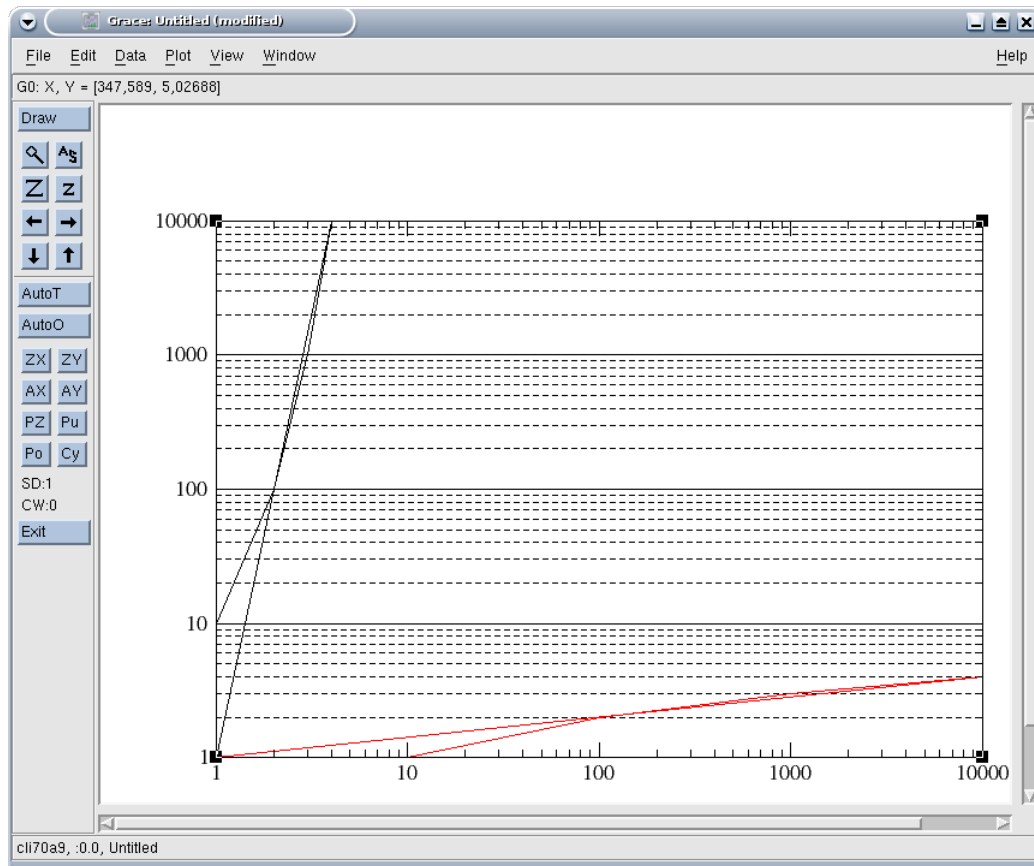


The decision to display or not a legend is given in the mitre Hand, the position of limbs of legend being defined in the Leg mitre. Box, the size of the caracatères used is specified in the Legend mitre. The text of legend, definite curves by curve, will be seen further.

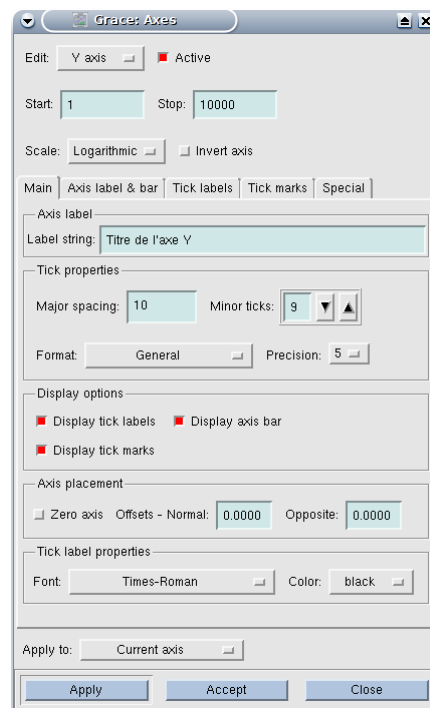


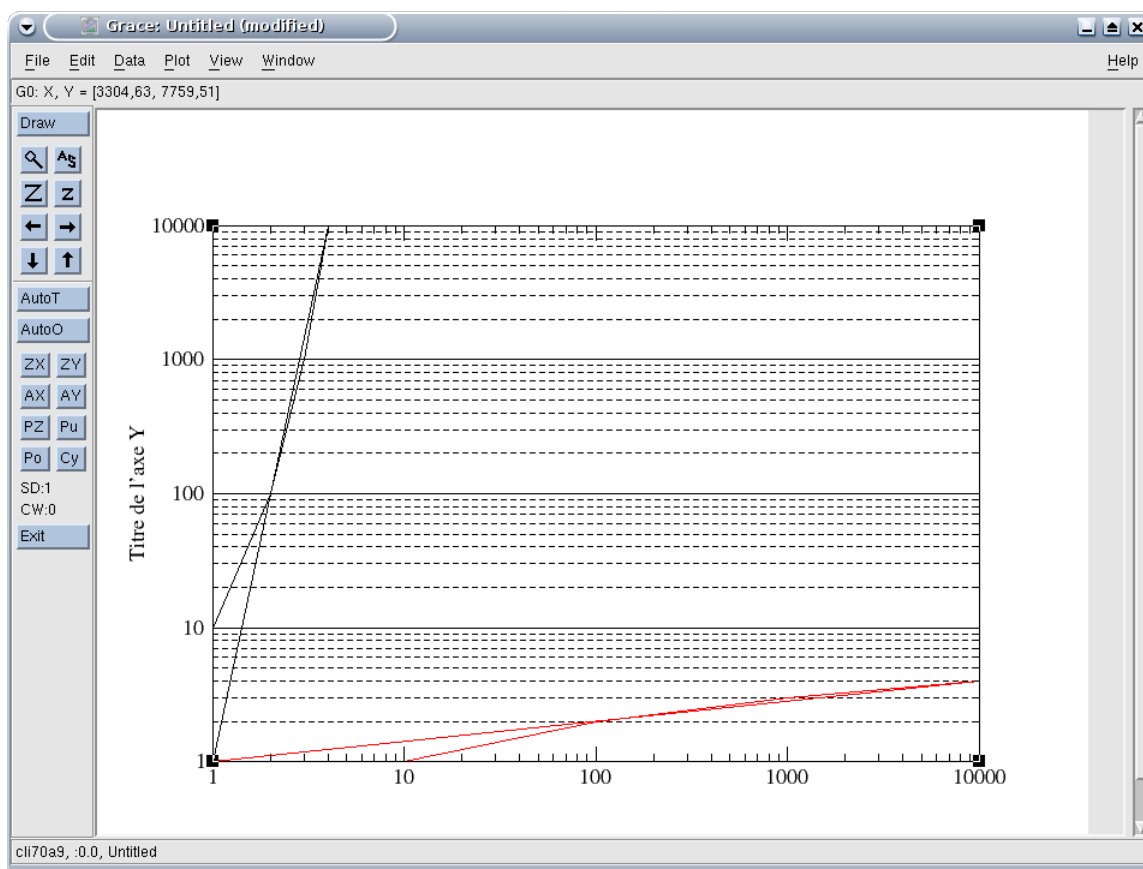
For the axes (thus the small Stud/Properties Axis), one is also satisfied with the most current orders. First of all it is necessary to note in the dialog box opened by Stud/Properties Axis the pull-down menu which makes it possible to define the axis which one is modifying (X axis, Y axis,...). In this one limps can choose the values of beginning and end of the axis (by the fields Start and End), as well as the type of graduation (linear, algorithmic, etc).



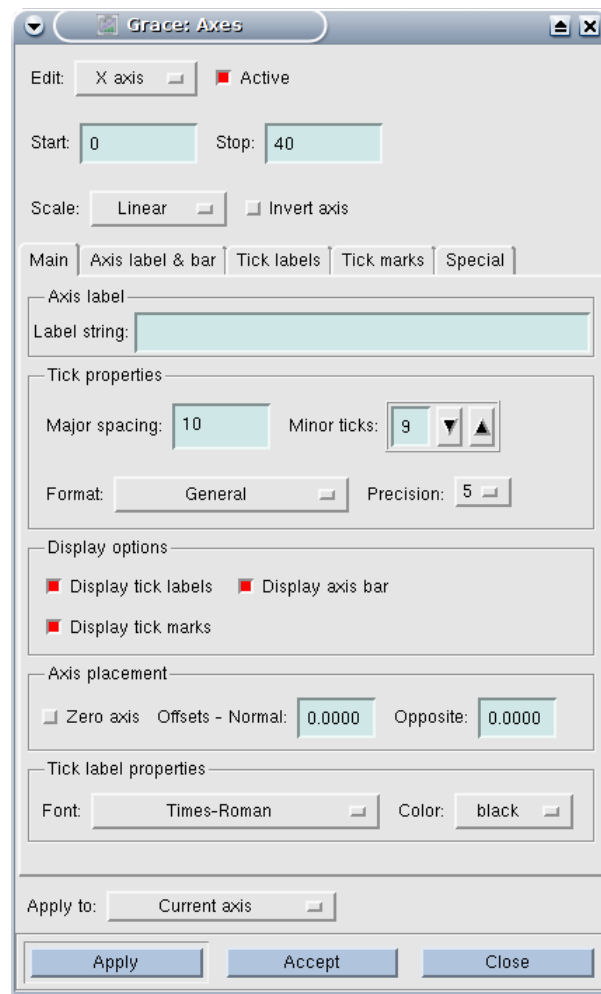


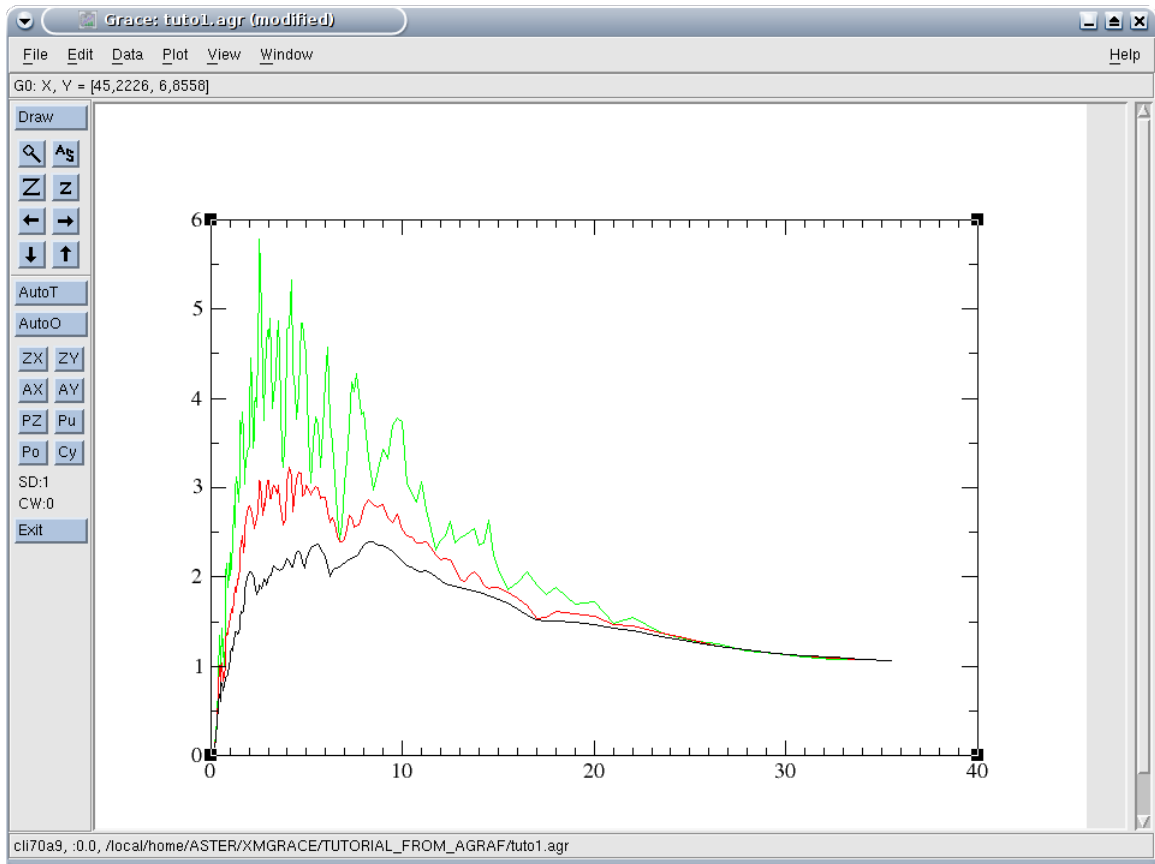
One can give a title (label) to the axes in the mitre Hand, the size of the characters like their orientation being defined in the mitre 'Axis label & bar'.





The great graduations (Major spacing, which is provided with an indication of value) and the small ones (minor ticks, which is only one feature) are also defined in the mitre Hand; it should be noted that the definition of the great graduations is done in the unit of the axes (for example to put 10 for an axis going from 0 to 100 to number of 10 into 10) while the small ones are of number of subdivision between each great graduation (for example to put 9 to graduate the preceding subdivisions of 10 all the 1 or 1 to graduate all the 5): to see following illustrations. The way of registering the values corresponding to each great graduation is defined in Tick labels, the way of tracing the large ones and the small graduations being indicated in Tick marks.





Grace: Axes

Edit: X axis  Active

Start: 0 Stop: 40

Scale: Linear  Invert axis

Main Axis label & bar Tick labels Tick marks Special

Axis label

Label string:

Tick properties

Major spacing: 20 Minor ticks: 1

Format: General Precision: 5

Display options

Display tick labels  Display axis bar

Display tick marks

Axis placement

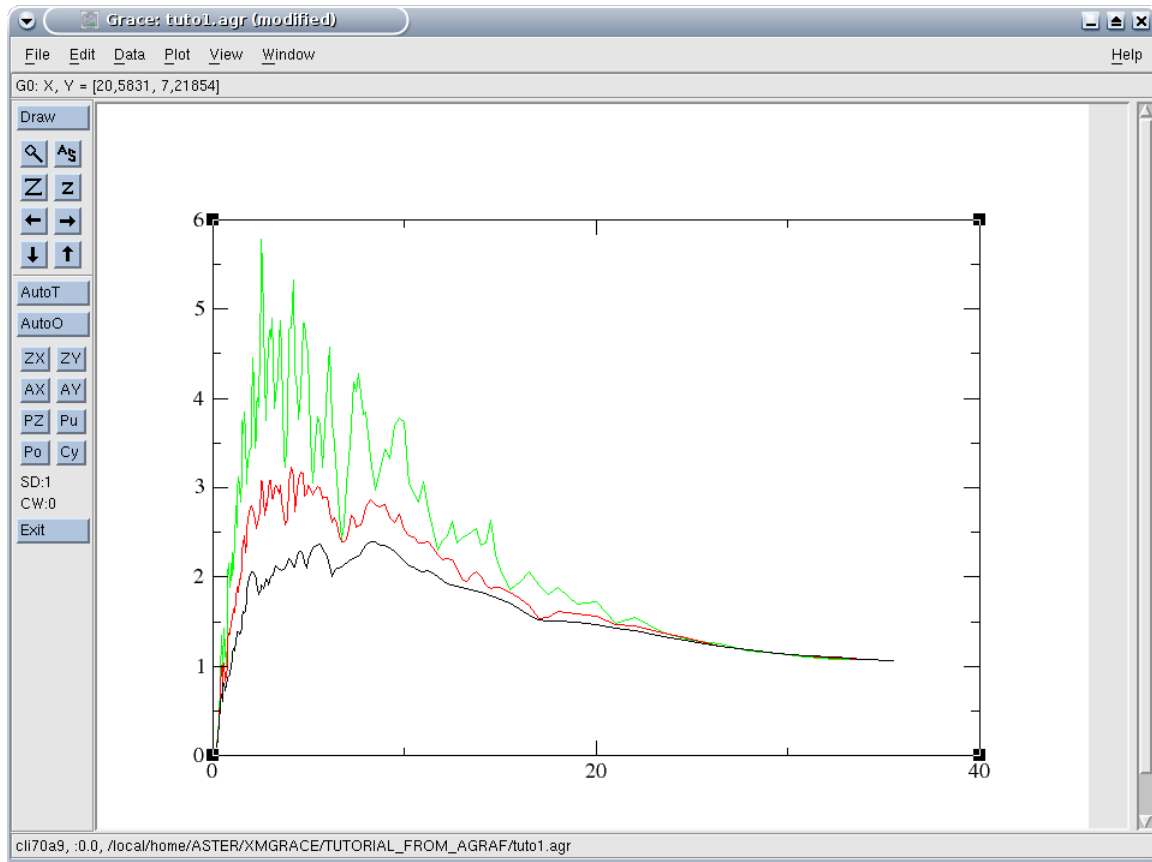
Zero axis Offsets - Normal: 0.0000 Opposite: 0.0000

Tick label properties

Font: Times-Roman Color: black

Apply to: Current axis

Apply Accept Close

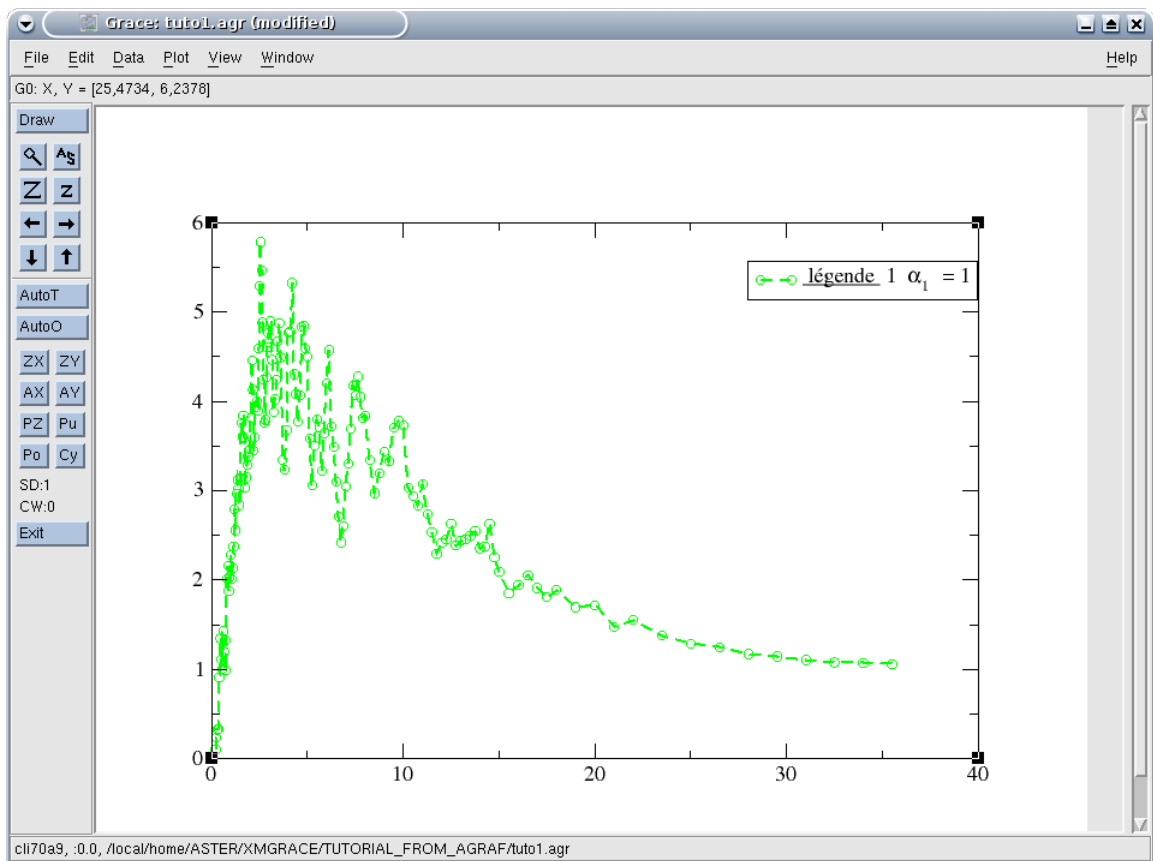
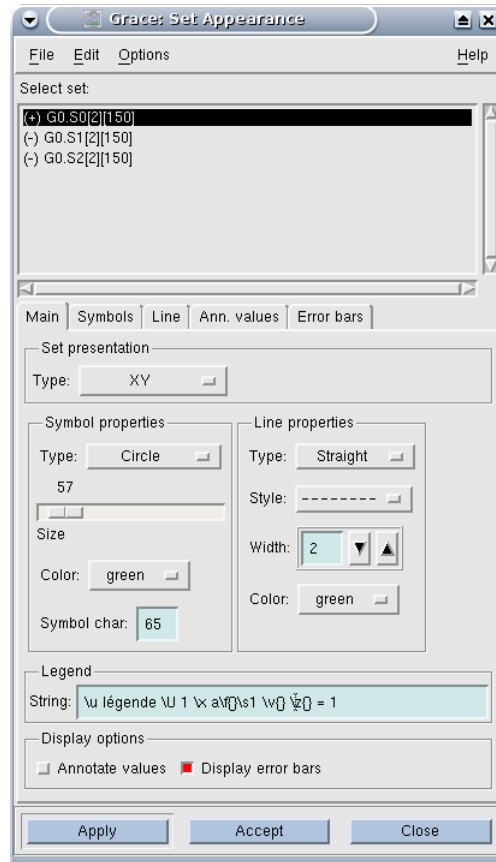


## 4.3 Working of the curves

Working of the curve is controlled starting from the small Stud/Set Appearance. In the dialog box opened by this menu, there is first of all a list of the curves contained in the graph running, which makes it possible to select the curve which one publishes the properties.

To attach a legend to a curve, it is necessary to define the text of the legend in the mitre Hand (Legend, G-string). It will be noted that it is possible to carry out complex legends.

One can choose the style of line, his color and his thickness as well as the symbols used to materialize each point in the mitre Hand (Line Properties and Symbol Properties). More precise definitions can be added in the mitres Line and Symbols respectively.



# Code\_Aster

**Version  
default**

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Titre : Notice d'utilisation de Grace pour Code\_Aster  
Responsable : COURTOIS Mathieu

Date : 12/05/2009 Page : 24/26  
Clé : U2.51.01 Révision :  
41c750d353e1

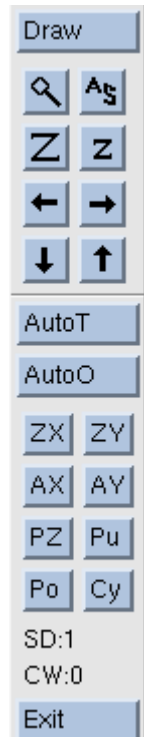


## 5 Use of the bar of tool

The bar of tool is vertically displayed in top on the left window Grace:

- The magnifying glass makes it possible to zoom in by defining a zone in the mouse;
- The icon "ACE" (for autoscale), makes it possible to redefine framing (zoom) automatically.
- Buttons "Z" and "Z" are used for die-zooming in and zooming in respectively.
- The arrows are used to move the traced zone.
- AutoT: automatic definition of the graduations starting from the curve nearest to the clicked point.
- AutoO: automatic framing starting from the curve nearest to the clicked point
- ZX, ZY: as the magnifying glass but in only one direction (X or Y)
- AX, AY: automatic framing in only one direction (X or Y)

The other buttons relate to the management of the pile of graphs and will not be explained here.

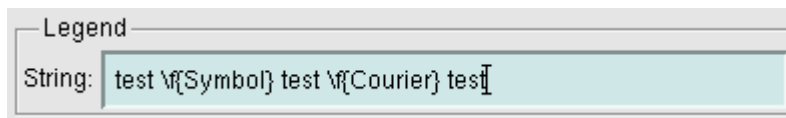


## 6 Tricks and tricks

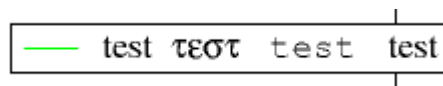
### 6.1 Extended characters, in particular Greek alphabet

It is possible to use other pig iron and cast iron of characters that the standard cast iron in any zone of text (legend of curve, label of axes, etc...). In particular, it is possible to use the cast iron "Symbol" to insert Greek characters.

For that, so in the field "G-string" of the legend one puts the following chain "test \ F {Symbol} test \ F {Arial} test", like that:



one obtains a legend which resembles that (the order \ F {X} changing the cast iron)



One will find in User' S Guides in the paragraph the 7.1 various orders allowing to control working of the zones of text (in particular pig iron and cast iron, size, the color, etc) and in the paragraph [§6.1] the mechanism of definition of different the pig iron and cast iron usable by Grace.

### 6.2 Not or comma?

By default, Grace is based on the environment user to know if it must represent the decimal digits with a point or a comma. On most recent systems, in France, it will thus use the comma. If it is necessary to print curves with points, under linux, should be made following handling: before launching Grace, making "export LC\_NUMERIC=POSIX" or "setenv LC\_NUMERIC POSIX" following Shell used.

### 6.3 Batch

It is possible to do without the graphic interface, in particular for the repetitive tasks, one will find examples of the use of the batch in the tutorial:

<http://plasma-gate.weizmann.ac.il/Grace/doc/Tutorial.html>