

plotplots >> plotplots > plotplots

# plotplots

plots curves or an existing axes along a discontinuous or multiscaled axis

## Syntax

```
plotplots(x, y, cutaxis, intervals)
plotplots(axes0, cutaxis, intervals)
plotplots(.., "ticksmode", "alt" | "shift")
plotplots(.., "widths", "isoscaled" | widths)
[Axes, curves] = plotplots(x, y, ..)
Axes = plotplots(axes0, cutaxis, intervals, ..)
```

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## Arguments

### x

vector or matrix of real abscissae of curves to plot.

- If  $x$  and  $y$  are vectors, we must have  $\text{length}(x) == \text{length}(y)$
- If it is a vector and  $y$  is a matrix, the same abscissae are shared for all curves given as  $y$  columns, and we must have  $\text{length}(x) == \text{size}(y, 1)$ .
- If both  $x$  and  $y$  are matrices, they must have the same sizes, and  $x(:, i)$  are abscissae of  $y(:, i)$ .

### y

real numbers: ordinates of curves to plot. If  $y$  is a matrix, each of its columns represents a separate curve.

### axes0

Input graphical axes to replot in a piecewise way. `.isoview="off"` is forced for all its piecewise replicates.

### cutaxis

"x" or "y", specifying the discontinuous graphical axis.

### intervals

( $N \times 2$ ) matrix of real numbers: Each row provides both `[start, end]` bounds of an interval over which all given curves or the input `axes0` must be plotted. According to the `cutaxis` value, given bounds are along the X axis or along the Y one. Any number of intervals may be specified as distinct `intervals` rows.

On the figure, intervals are plotted from left to right in the order they are specified in `intervals`. The user may organize and present them as wished.

When an interval is specified such that `start > end`, the axis is reversed on the interval.

### "ticksmode"

By default, ticks and labels of the different parts of the discontinuous axis are drawn "aligned", without specific attribute to distinguish consecutive parts. `"ticksmode"` is an optional flag allowing to manage ticking and labelling of alternate

pieces of the cut axis. It must be followed by one of the following values:

"alt" Ticks and labels are drawn alternately on the bottom and top sides for the "x" discontinuous axis, or on the left and right sides for the "y" one.

"shift" Ticks and labels are drawn with a small alternative shift for one interval over two of the discontinuous axis.

## "widths"

By default, if N intervals are defined, the full plot width is split into N sections of equal widths, whatever are the  $|end - start|$  data ranges. This default plotting mode may be changed using the "widths" keyword, followed by one of the following specifications:

"-" As the default mode, except that interspaces separating sections are removed.

"isoscaled" This mode plots data with the same scale for all intervals along the discontinuous axis. The plotting width is proportional to the  $|end - start|$  range.

"-isoscaled" will do the same, except that interspaces separating sections are removed.

widths Vector of numbers giving the relative graphical widths of intervals along the discontinuous axis. The vector must have as many values as there are defined intervals.

To remove the separating space before an interval, set its width as negative. Its absolute value will be used for the actual width.

Only  $|widths| / \text{sum}(|widths|)$  is considered, in such a way that  $[1,2,2]$  and  $[0.5,1,1]$  or  $[0.2,0.4,0.4]$  are for instance equivalent.

## Axes

vector of pointers on plotted sub-axes. The components allow to modify subaxes attributes, like the log mode of the piece of discontinuous axis, the grids, etc. See examples for illustrations.

Axes(\$) points to the common continuous axes. plotplots() sets it as the current axes before returning.

## curves

list of vectors of pointers on plotted curves (only when they are provided):

- `curves(i)` is a vector of graphic pointers on all sections drawn for the curve #i defined in `y(:,i)`.
- `curves(i)(j)` points to the section #j drawn for the curve #i over `intervals(j,:)`.

These identifiers allow to modify curves attributes after plotting. For instance, setting in red all pieces of the curve #2 will be done with `curves(2).foreground = color("red")`. Setting only its section #3 in dash style is done with `curves(2)(3).line_style = 3`. An example is given and illustrated below.

 The vector of handles of curves #i1 to #i2 > #i1 of the same section #s may be retrieved with `Axes(s).children($).children($-i1+1:-1:$-i2+1)`.

## Description

`plotplots()` allows to plot some curves along a non-regular axis, like having some hidden intervals. Consecutive visible intervals are drawn without loosing space in-between.

When an input axes `axes0` is provided instead of `curves`, it is replicated as many times as there are intervals, each copy showing the axes contents over an interval. The X, Y, and Z labels as well as the title of `axes0` are ignored.

In both cases, `plotplots()` draws in the `gca()` plotting area. If `axes0` is `gca()`, `plotplots()` deletes it before returning. Otherwise, `axes0` is kept in its own graphical area.

The intervals of the discontinuous axis may have distinct scales, distinct linear or logarithmic modes, distinct direct or reversed modes.

A symmetrical axis may be plotted by repeating an interval along the discontinuous axis and reverting the clone. See examples.

 `plotplots()` can be used in conjunction to the following features:

- `subplot(..)` or `xsetech(..)` can be used to define the plotting area before calling `plotplots()`.
- A zoom box spanning over several pieces of the discontinuous axis may be selected interactively.

## Titles, legends and datatips

### plotplots() from an initial axes0:

The general title and the labels of the x and y axis are copied from the initial axes0. If any, datatips are also copied. However, a given datatip can't be dragged from an interval of the plot to other ones.

### plotplots(x,y,..) of some given curves, from scratch:

*General title, title of the continuous common axis:* title(), xtitle(), xlabel() when cutaxis is "y" or ylabel() when cutaxis is "x" can be used as usual after calling plotplots().

*Title of the discontinuous axis:* It is highly recommended to set a title to the axis of the most central plotted section, rather than to the axis of the overall axes (which introduces a parasitic shift). The handle of the targeted section will be used in conjunction to xlabel() or ylabel(). Please see examples.

*Datatips:* can be set as usual on curves drawn with plotplots(). However, a given datatip can't be dragged from an interval of the plot to other ones.

**Block of curves legends:** Such a block can be defined in a given plotting interval, by targeting the related axes:

```
sca(axes(i));
legend(["Curve 1" "Curve 2"],"in_upper_left");
```

The chosen position refers to the bounds of the targeted section. There is no way to refer to the whole axes defining the shared axis.

## Examples

### "ticksmode" and "widths" options. Addressing and customizing the curves

```
x = [-7.5:0.5:200]';
y = exp(x/30).*(1+0.5*sin(x));

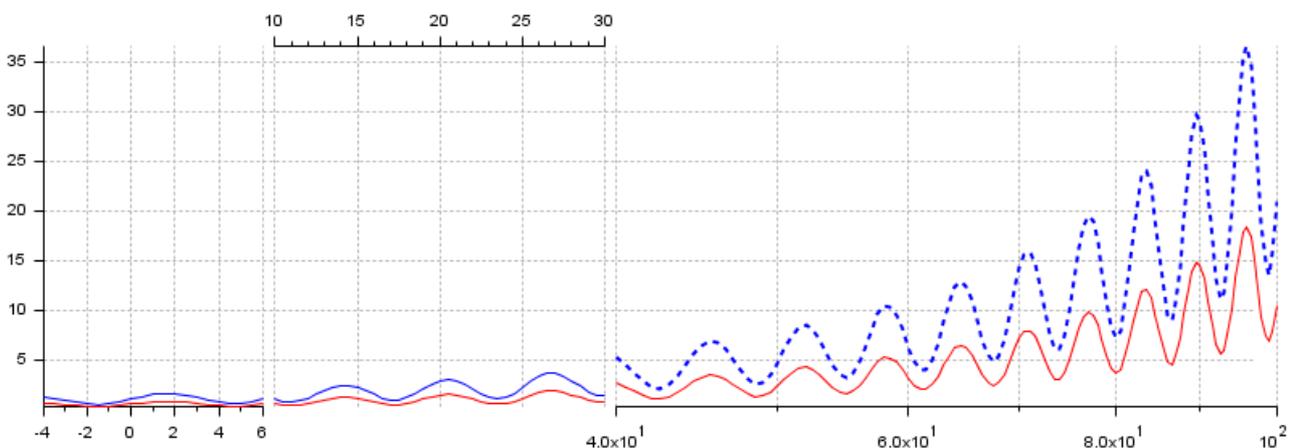
f = gcf(); f.axes_size = [1000 300];
clf

intervals = [-4 6; 10 30; 40 100];
[a, c] = plotplots(x, [y y/2], "x", intervals, "ticksmode", "alt", "widths", [1 1.5 3]);

// Special curves settings:
c(2).foreground = color("red"); // 2nd cuve in red
c(1)(3).line_style = 8; // 3rd section of 1st curve in small dashes
c(1)(3).thickness = 2; // .. and thicker

// Invert the common Y axis
//a.axes_reverse = ["off" "on"];

// Setting X-axis of the third section in Log:
a(3).log_flags = "lnn";
```



### Replicated and inverted interval

plotplots() allows to specify overlaying intervals, or the same interval several times, or twice the same but in reverse order. This may be useful in various situations. For a positive radial coordinate, it is thus possible to tick a positive distance from the center on both sides. A side can be plotted in radial linear scale, and the other in radial logarithmic scale to show the asymptotical behavior:

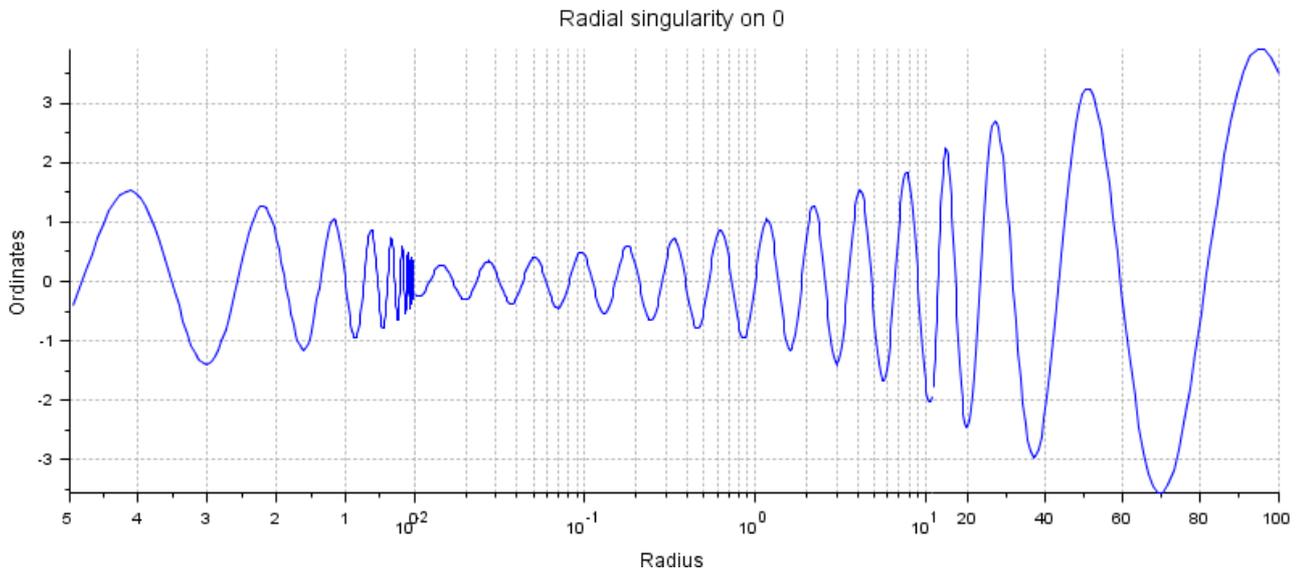
```

x = logspace(-2,2,500)';
y = sin(10*log(x)).*(x.^0.3);

f =(gcf()); f.axes_size = [1000 370];
clf

intervals = [5 0 ; 0.01 11 ; 11 max(x)];
[a, c] = plotplots(x, y, "x", intervals, "widths", -[2 3 2]);
a(2).log_flags = "lnn";
a(2).sub_ticks(1) = 8;
title("Radial singularity on 0", "fontsize", 3)
ylabel("Ordinates", "fontsize", 2)
xlabel(a(2), "Radius", "fontsize", 2);

```



## Multi-scaled Y axis:

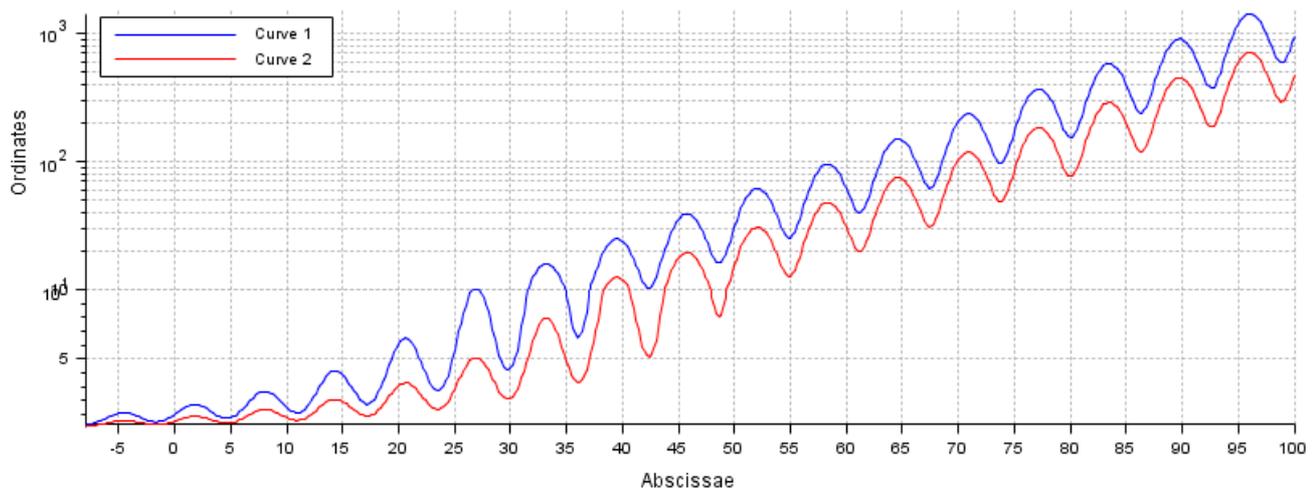
### Example #1, with curves legends:

```

x = [-8:0.2:100]';
y = exp(x/14).*(1+0.5*sin(x));
intervals = [0.01 10 ; 10 max(y)];

f =(gcf()); f.axes_size = [1000 400];
clf
[a, c] = plotplots(x, [y y/2], "y", intervals, "widths", -[1 2]);
c(2).foreground = color("red");
a(2).log_flags = "nln";
a(2).sub_ticks(2) = 8;
xlabel("Abcissae", "fontsize", 2)
ylabel(a(2), "Ordinates", "fontsize", 2) // a(2) is now the current axes
legend(["Curve 1" "Curve 2"], "in_upper_left");
// Grids
// a($).grid(1) = -1; // removes the vertical shared grid
// for i=1:length(a)-1, a(i).grid(2)=-1; end // removes the horizontal grids

```



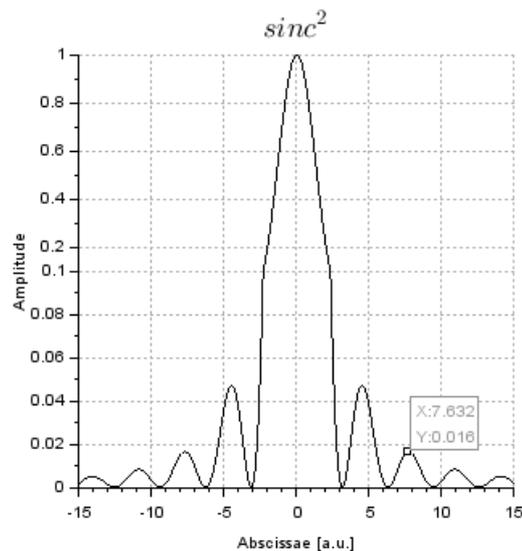
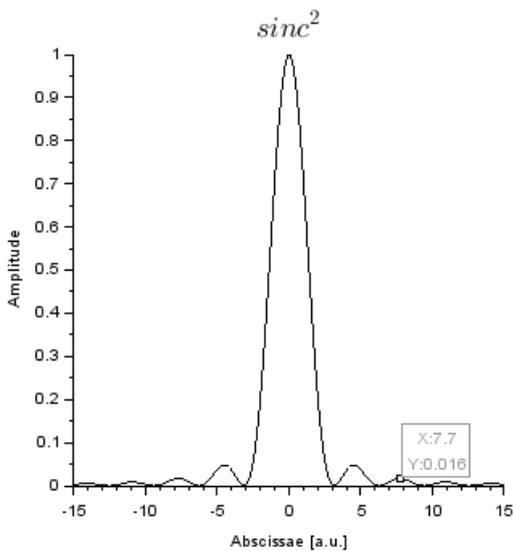
## Example #2, from an axes: Low $\text{sinc}^2()$ bouncing wings

Here below we plot the curve to create its initial axes in `subplot(1,2,1)`. Then we move `gca()` to `subplot(1,2,2)`, and we call `plotplots(..)` :

```
x = linspace(-15,15,400);
clf
subplot(1,2,1)
gcf().axes_size = [720 360];
plot2d(x, sinc(x).^2)
ax0 = gca();

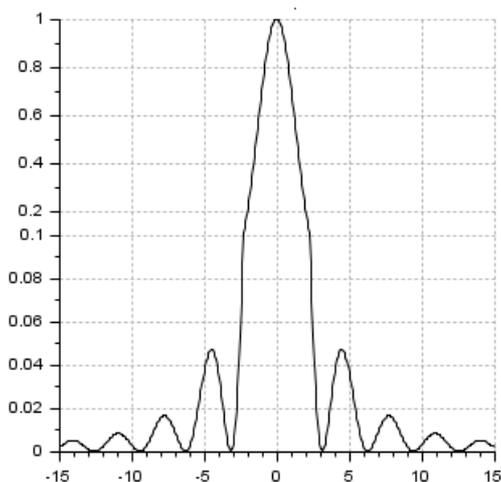
d = datatipCreate(gcf().children, [7.7 0.02]);
xtitle("$\LARGE \text{sinc}^2$", "Abscissae [a.u.]", "Amplitude")
grey = color("grey60");
set(d, "mark_size",4, "foreground",grey, "font_foreground",grey, "orientation",8);

subplot(1,2,2)
Axes = plotplots(ax0, "y",[0 0.1 ; 0.1 1], "widths","-");
is_handle_valid(ax0) // %T: the initial axes still exists
```



Now, `gca()` is kept where we have initially plotted the curve, and we call `plotplots()` to replicate it. As a consequence, `plotplots` uses the same subplot area, and finally deletes the initial axes after its replication:

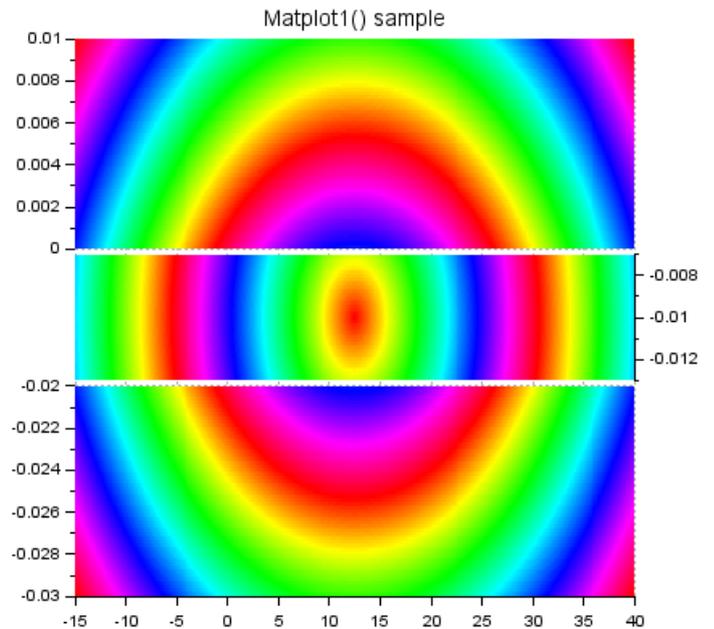
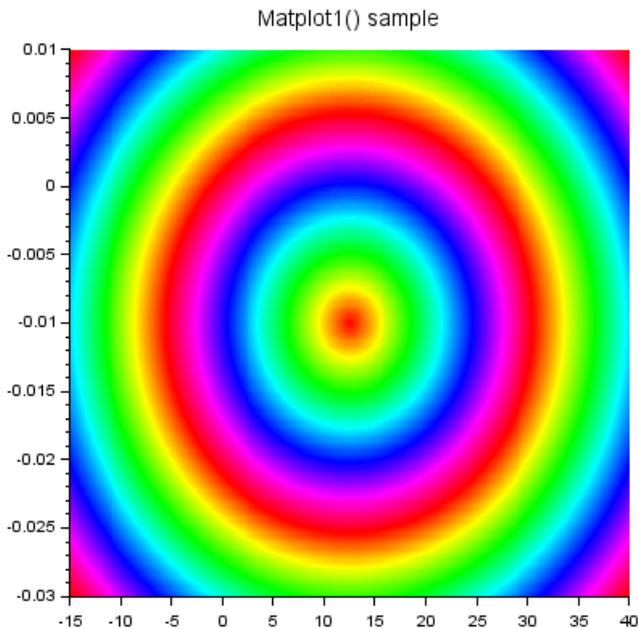
```
x = linspace(-15,15,400);
clf
subplot(1,2,1)
gcf().axes_size = [720 360];
plot2d(x, sinc(x).^2)
ax0 = gca();
Axes = plotplots(ax0, "y",[0 0.1 ; 0.1 1], "widths","-");
is_handle_valid(ax0) // %F: the initial axes has been deleted
```



## Example with Matplot1():

```
clf
gcf().axes_size = [925 455];
subplot(1,2,1)
Matplot1();
xtitle("", "", "");
title("Matplot1() sample", "fontsize", 3);
x0 = gca();

subplot(1,2,2)
intervals = [-0.03 -0.02; -0.013 -0.007 ; 0 0.01];
axes = plotplots(x0, "y", intervals, "ticksmode", "alt", "widths", "isoscaled");
```



## See Also

- <https://atoms.scilab.org/toolboxes/plotplots>
- [plot2d](#)
- [plot](#)

## Author

(C) Samuel GOUGEON

## History

Version	Description
1.0 - 2018-01	Initial release
2.0 - 2018-06	<ul style="list-style-type: none"><li>• <code>plotplots()</code> can now process an existing axes and its whole content.</li><li>• <code>plotplots(...,intervals,cutaxis,...)</code> becomes <code>plotplots(...,cutaxis,intervals,...)</code></li><li>• <code>[hcurves, Axes] = plotplots(x,y,...)</code> becomes <code>[Axes, hcurves] = plotplots(x,y,...)</code></li><li>• Messages are now available in French, German, Japanese, Portuguese, Russian, and Spanish.</li></ul>

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