

PlotXYZ is a 2D/3D plotting program which accepts *plotxy* type of commands. It can plot 2D graphs, contours, surfaces and vector fields. The 2D plots are done by the command **graph** instead of *plot* in *plotxy*. Contour and surface plots are done by the command **contour** and **surface**, respectively. A vector field can also be plotted by **graph** with a specification with the **field** command. To use **PlotXYZ**, enter **pltxyz < plotfile**, where *plotfile* is a script file containing the plotting commands. After the execution, **PlotXYZ** automatically generates a Postscript file called *graph.ps*. This file can be viewed in the X-window through a Postscript previewer, like *gs* or *ghostview* or printed by a printer.

A list of commands and proper parameters is given below. [] indicates optional parameters. For a quick start see the example in APPENDIX. Send questions and comments to **fang@math.odu.edu**.

character *size* [*ang*]

Specify the size(in inch) and angle of texts in labels and in commands **print** and **note**.

clabel [*size*] [*ang*] [*ndigit*]

Specify contour labeling. This will cause the contour lines be labeled with contour levels. To change to non- labeling, enter a negative *size* value. Parameter *ang* specifies the angle of the labels and *ndigit* specifies the number of digits in the labels. Note : after the **clabel** is used, the font size afterward is set to be the same as the clabel size. To reset the font size, use **psfont** command after **clabel** command (This is yet to be fixed). Default *size* = 0.12, *ang* = 0, *ndigit* = 3.

clvs *n* *c1* *c2* ... *cn*

Specify the number and levels of contours. if *n* < 0, then exactly |*n*| number of contours are drawn at levels given by *c1* *c2* ... *cn*; if *n* > 0, contour levels are generated automatically by **PlotXYZ** and *c1* *c2* ... *cn* need not be given.

comment *n* *x0* *y0*

print *n*th comment starting at (*x0*, *y0*). The comments are read in from a file using **mode 99**. To reset comments, enter **comment**. The coordinates of the comment is in the present coordinate system defined in the **xlim** and **ylim** commands. The coordinate (*x0*,*y0*) could be inches measured from the lower left corner of the paper when command **truein** has been used. This command is very useful when certain data in the file are to be printed in the graph.

contour *x0* *y0*

Plot the contours with origin at (*x0*,*y0*) inches relative to the previous graph.

dash *d1* *d2* [*d3*] [*d4*]

Set the dash pattern with *d1*, *d3* inches solid and *d2*, *d4* inches space. *d3* and *d4* are optional. If *d3* is negative, the dash pattern is only for negative contour levels. To use solid lines, set *d1* to be negative. Default : *d1* = -1.

date

Print the date and time at the lower left corner of the paper.

digits *mag* *ndigits*

Specify the digits in the axis labeling. The axis labels are expressed as $f \times 10^m$ where *ndigits* is the significant digits desired for *f*. Note when *m* < *mag*, the labels are written as floating point numbers. Default : *mag* = 3, *ndigits* = 4.

dimension *nx ny*

Specify the dimension of the data. This command is necessary for 3D contours and surfaces. It indicates that plotting data are on a $nx \times ny$ uniform mesh. It is preferred that the data file is such that ny points followed by ny points with increment in the x direction :

Preferred Data structure

3-column			or	1-column
x(1)	y(1)	z(1 , 1)		z(1 , 1)
x(1)	y(2)	z(1 , 2)		z(1 , 2)
				...
				...
x(1)	y(ny)	z(1 , ny)		z(1 , ny)
x(2)	y(1)	z(2 , 1)		z(2 , 1)
				...
				...
				...

field [*size*] [*arrow size*] [*angle*] [*grey*]

Use this command to indicate that a vector field is to be drawn in the **graph** command. The data for the vector field is read in using the **mode 40** option. The parameters specify the arrow drawn. *size* is the relative length of the vector, *arrow size* and *angle* are the specifications of the arrow. The arrows can be filled with specified grey scale. Defaults : *size*=1, *arrow size*=1, *angle*=15 (degree), *grey*=1.0.

file *name*

Specify the file name containing the plotting data.

fill [*g*] [*wd*]

Use this command to indicate that the lines in the **graph** command is to be closed and filled with gray of level *g*. Note that *g*=1 : white, *g*=0, black. The width of the line is specified by *wd*.

frame *on[off]*

Draws a frame for the plot.

graph [*x0*] [*y0*]

Execution of the 2D plots and write the postscript output. The lower left point of the plot is (*x0*,*y0*) inches relative to the previous plot or the lower left corner of the paper if this is the first graph.

grid [*ngx*] [*ngy*] [*wd*] [*gray*]

Add a grid to the graph. By default grid lines at tic marks are drawn. If more grid lines are desired, additional grid lines can be specified by assigning values to *ngx*, *ngy*, which indicate the number of grid lines between tic marks. *wd* and *gray* specify the width and gray used for the grid lines. To change to no grids, type : **grid -1**. Default : *ngx*=0, *ngy*=0, *wd*=0.2, *gray*=0.5.

jump *n*

Read the datafile every other *n* lines. For no jump, enter **jump 0**. Default : *n*=0.

mesh *nlx nly [nmesh]*

Specify the mesh for the surface plot. *nlx* lines parallel to y and *nly* line parallel to x are drawn. if *nmesh* = 1, then exactly *nlx* by *nly* mesh is drawn for the surface. The data on missing grids are obtained by interpolation. If *nmesh* = 2, the input data are on a non-uniform grid and *nlx* by *nly* grid is made by interpolation. (*nmesh*=2 option has not been implemented yet). Default *nmesh* = 0

midline *n [width] [x0 y0]*

Draw straight lines across the point (x0,y0). When *n*=1, a horizontal line is drawn. When *n*=2, a vertical line is drawn. When *n*=3, centerlines in both x and y directions are drawn. To reset the centerlines, enter **midline** or **midline 0**. Default : *n*=0, *width*=0.5, *x0*=0, *y0*=0.

mode 20 *c1 c2*

Specify the data structure in the data file, where column *c1* is for x axis and *c2* column is for y axis. For example, **mode 20 1 3** indicates that the first column is the x and the third column is the y.

mode 30 *c1 c2 c3*

Specify the 3D data file structure, column *c1* for x, *c2* for y and *c3* for z. For example **mode 30 2 1 3** denotes column 2 is x, column 1 is y and column 3 is z. If input data is in one column, enter **mode 30 1 1 1**.

mode 40 *c1 c2 c3 c4*

Specify the vector field data file structure, column *c1* for x, *c2* for y and *c3* for u, *c4* for v. For example **mode 40 2 1 4 3** denotes column 2 is x, column 1 is y and column 4 is u, column 3 is v.

mode 99

This mode allows the next **read** statements to read in ascii lines from the file. These ascii lines then can be printed using the **comment** command. This is most convenient when the data file has certain variable parameters need to be documented in the graph. For example, **read 2** after **mode 99** means to read in two lines in the datafile as is and print them in the graph as comments. To change from comment reading to data reading, use **mode 20** or **mode 30**.

note

Same as in plotxy.

print (*x,y*) *text-string*

Print *text-string* at coordinate (*x,y*). The subscript and superscript are expressed as _~ and [^]. The **note** command of plotxy still works. A **print** command without coordinates and text-string can be used to cancel all the previous text-strings. This is necessary for multiple graphs.

psfont *fsize [fnumber]*

Specify the font size and type to be used in axis labeling and texts. *fsize* in inches. Default : *fsize* = 0.1, *fnumber*=1.

fnumber	font type
1	Times-Roman
2	<i>Times-Italic</i>
3	Times-Bold
4	<i>Times-BoldItalic</i>
5	Courier

$n=1$	box
2	○ circle
3	◇ diamond
4	filledbox
5	● filledcircle
6	filleddiamond
7	× cross
8	△ triangle
9	filledtriangle
10	crossbox

thickness *width*

Change the line width in the plots. The unit is points (72 points= 1 in). Default : *width* = 0.2.

truein [-1]

Indicates that (x,y) coordinate in **print** and **comment** commands is in inches measured from the lower-left corner of the paper. To change back to coordinate system of the plot, enter **truein -1**.

view θ ϕ

Specify the viewing angle for the surface plot. θ : angle in degrees rotated clockwise about x-axis; ϕ : rotated counter-clockwise about z-axis. Defaults : $\theta=30$, $\phi=30$.

xlabel *text*

Specify the axis label. The superscripts and subscripts are entered as $\wedge$ and $_$ respectively. Greek letters use back slash. For example, **\a** and **\b** gives α and β .

xlim *xlength* [*x1 x2*] [*x3*]

Specify the axis. *xlength* is the length in inches, *x1* and *x2* are the minimum and maximum of the axis respectively. *x3* indicates the number of tic marks. If *x3* is negative, the axis is not labeled. If *x3*=-2, no axis is drawn.

ylabel *text*

See **xlabel**.

ylim *ylength* [*y1 y2*] [*y3*]

See **xlim**.

zlabel *text*

See **xlabel**.

zlim *zlength* [*z1 z2*]

zlength specifies the length of the z axis in inches. Optional for contour plots. When specified, contour levels below *z1* or above *z2* are not plotted.

APPENDIX

```
xlim 3 0 20
ylim 2 -1 1
xlabel x
ylabel Bessel Functions
midline 1
mode 20 1 2
file fort.81
read
dash 0.05 0.05
mode 20 1 3
file fort.81
read
dash 0.2 0.1
mode 20 1 4
file fort.81
read
print (5,1.2) a simple graph
graph 1.0 8.2
print

frame
grid 1 1
psfonts 0.16 14
thickness 0.5
xlim 3 0 20 5
ylim 2 -1 1 5
xlabel x
ylabel Bessel J Functions
midline 1
mode 20 1 2
dash -1
file fort.81
read
dash 0.05 0.05
mode 20 1 3
file fort.81
read
dash 0.2 0.1
mode 20 1 4
file fort.81
read
print (1.5,0.8) J.0
print (8,0.32) J.1
print (17,0.27) J.2
print (5,1.2) graph with more options
graph 4.0 0
print

xlim 2.5 -20 20 5
ylim 2.5 -20 20 5
xlabel x
ylabel y
```

```
midline
dash -1
dimension 201 201
mode 30 1 2 3
file fort.83
read
clvs 10
print (-10,25) a contour plot
contour -4 -4.0
print

xlim 2.5 -20 20
ylim 2.5 -20 20
zlim 1 -1 1
xlabel J_0
dash 1 0
mesh 51 51 1
view 50 20
file fort.83
read
surface 4.5 0

xlim 2.5 -1 1
ylim 2.5 -1 1
mode 20 1 2
file edge.data
read
fill 0.5 0.5
graph -4.5 -3.5
file edge.data
read
print (-0.5,1.2) a vector field plot
graph 0 0

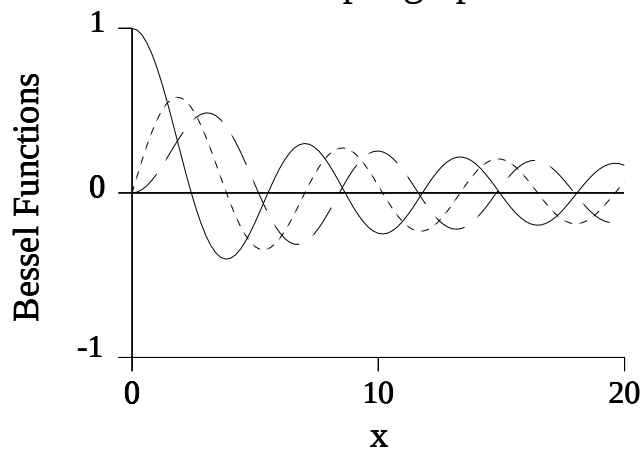
mode 40 1 2 3 4
file fort.62
skip 2821
skip 2821
skip 2821
skip 2821
read 2821
field
graph 0 0

stop
```

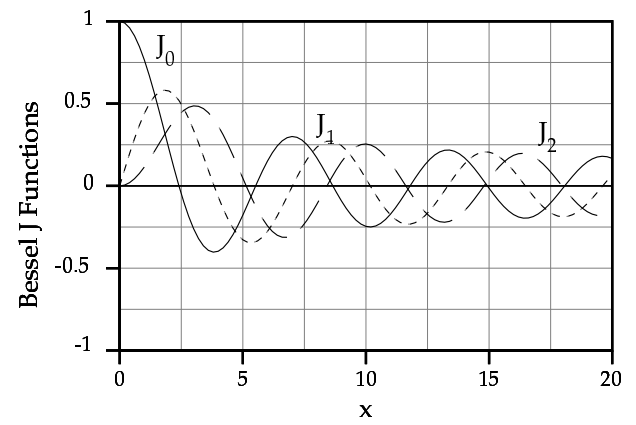
INDEX

character *size*
clabel *[size] [ang] [ndigit]*
clvs *n c1 c2 ... cn*
comment *n x0 y0*
contour *x0 y0*
dash *d1 d2 d3*
date
dimension *nx ny*
field *[size] [arrow size] [angle] [grey]*
file *name*
fill *[g] [wd]*
frame *on[off]*
graph *[x0] [y0]*
grid *[ngx] [ngy] [wd] [gray]*
jump *n*
mesh *nlx nly [nmesh]*
midline *n [width] [x0 y0]*
mode
mode 30 *c1 c2 c3*
mode 40 *c1 c2 c3 c4*
mode 99
note
print *(x,y) text*
psfont *fsize [fnumber]*
range *n lower-lim upper-lim*
read *[number of records]*
skip *[number of records]*
stop
surface *x0 y0*
symbol *n [s]*
thickness *width*
truein *[-1]*
view *theta phi*
xlabel *text*
xlim *xlength [x1 x2] [x3]*
ylabel *text*
ylim *ylength [y1 y2] [y3]*
zlabel *text*
zlim *zlength [z1 z2]*

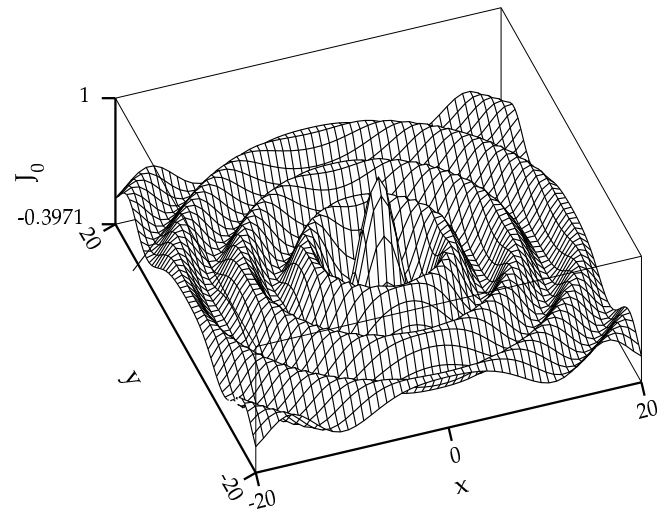
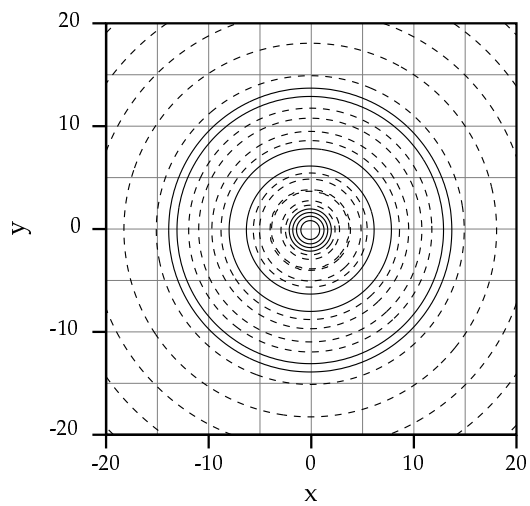
a simple graph



graph with more options



a contour plot



a vector field plot

