GNUPLOT
Unas breves notas

Gnuplot: Comandos Básicos (I)

- Para representar una función se emplea el comando:

  plot "función"

- Si, en lugar de una, queremos representar varias funciones, éstas se separan por comas:

  plot "función1","función2",...

- Para cambiar el intervalo en el cual se representan las funciones se emplea:

  set xrange[min:max] ***set yrange[min:max]***

- Para nombrar los ejes o la gráfica se usa:

  set xlabel "nombre eje X" ***set ylabel "nombre eje Y"***

  set title "nombre de la gráfica"

Ejercicio: Probar todos estos comandos

Gnuplot: Comandos Básicos (II)

- Para representar un conjunto de datos de un archivo se emplea el comando:

plot "arch.ext" u #1:#2

#1: *Columna datos X,* ***#2***: *Columna datos Y*

- Si los datos a representar tienen barras de error, éstas pueden mostrarse haciendo:

plot "arch.ext" u #1:#2:#3:#4 w xyerrorbars

#3: *Columna datos error X,* ***#4***: *Columna datos error Y*

- En Gnuplot es posible realizar ajustes de un conjunto de puntos a una función dada usando el comando ***fit***:

Ejemplo:

y(x)=a*x+b

fit [xmin:xmax][ymin:ymax] y(x) "arch.ext" u #1:#2 via a,b

Ejercicio: Probar todos estos comandos

Gnuplot: Comandos Básicos (III)

Ejercicios:

- Ajustar mediante una regresión lineal los datos del fichero “gray-kangaroos.dat” y comprobar el valor del estadístico R con el comando *stat*.

- Ajustar los datos del fichero “cavendish.dat” a la curva:

$$\theta(t) = \theta_0 + a \exp\left(-\frac{t}{\tau}\right) \sin\left(\frac{2\pi t}{T} + \phi\right)$$

Gnuplot: Comandos Básicos (IV)

- Gnuplot también permite representar funciones o datos en 3D, mediante el comando ***splot***:

splot "arch.ext" u #1:#2:#3 ***splot f(x,y)***

#1: *Columna dat X,* ***#2***: *Columna dat Y,* ***#3***: *Columna dat Z*

- Podemos cambiar el formato de nuestras gráficas haciendo uso de diferentes comandos: ***ls, lw, lc, ps, pt,...***

Ejemplos:

plot sin(x) w l lw 5 lc 2

plot sin(x) w p ps 1 pt 2 lc 3

Ejercicio: Probar todos estos comandos

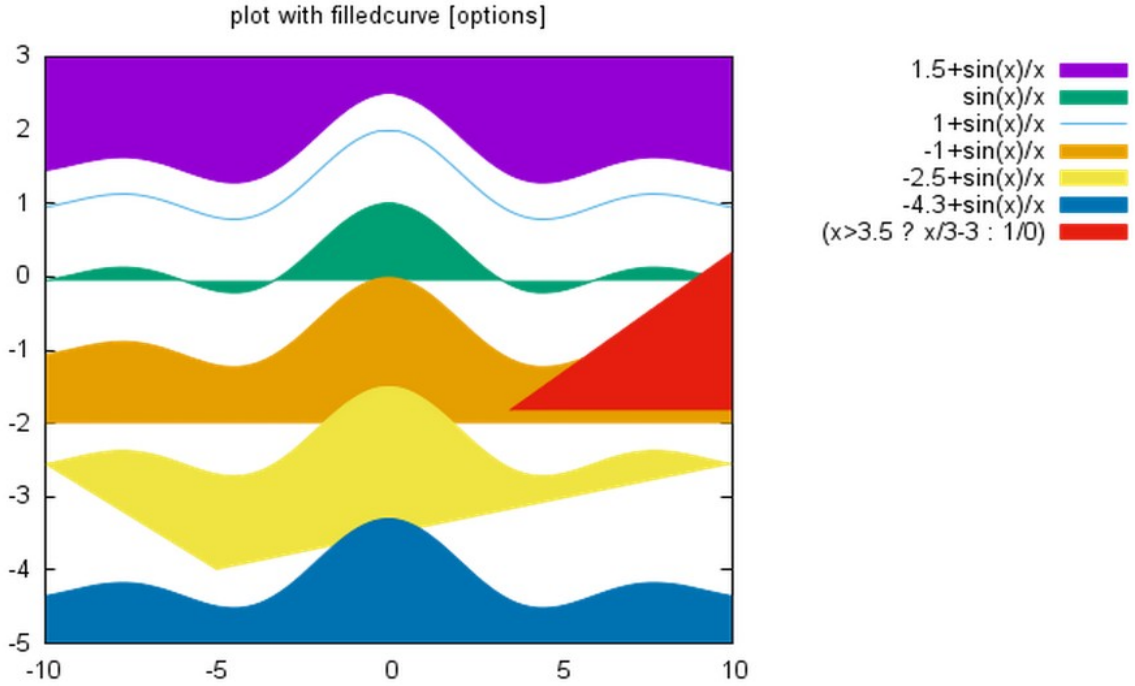
Gnuplot: Ejemplos

A continuación, se muestran unos ejemplos con sus correspondientes scripts. Todos ellos (y muchos más) se pueden encontrar en la web:

http://www.gnuplot.info/

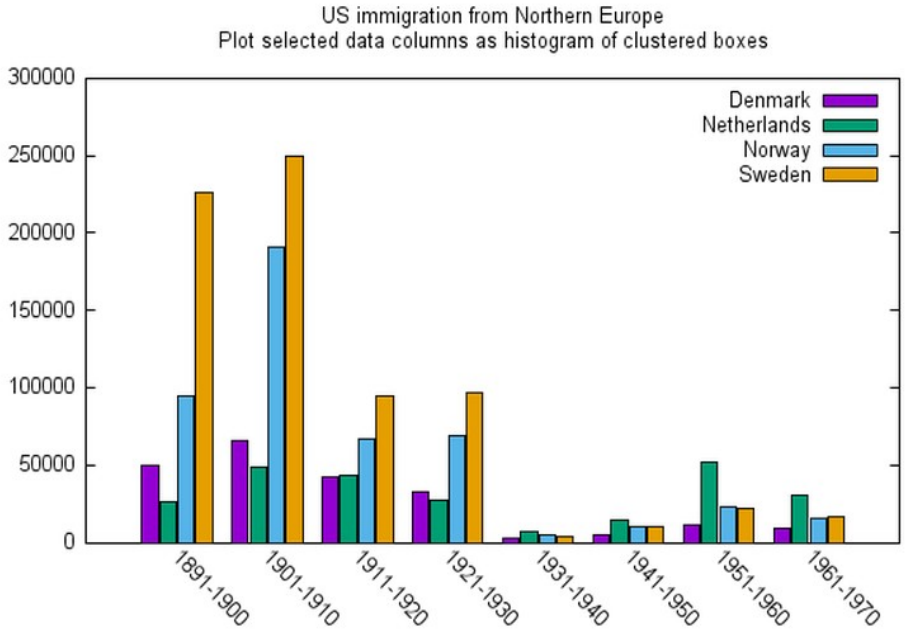
En la sección ***Gallery of Demos***

Gnuplot: Ejemplos



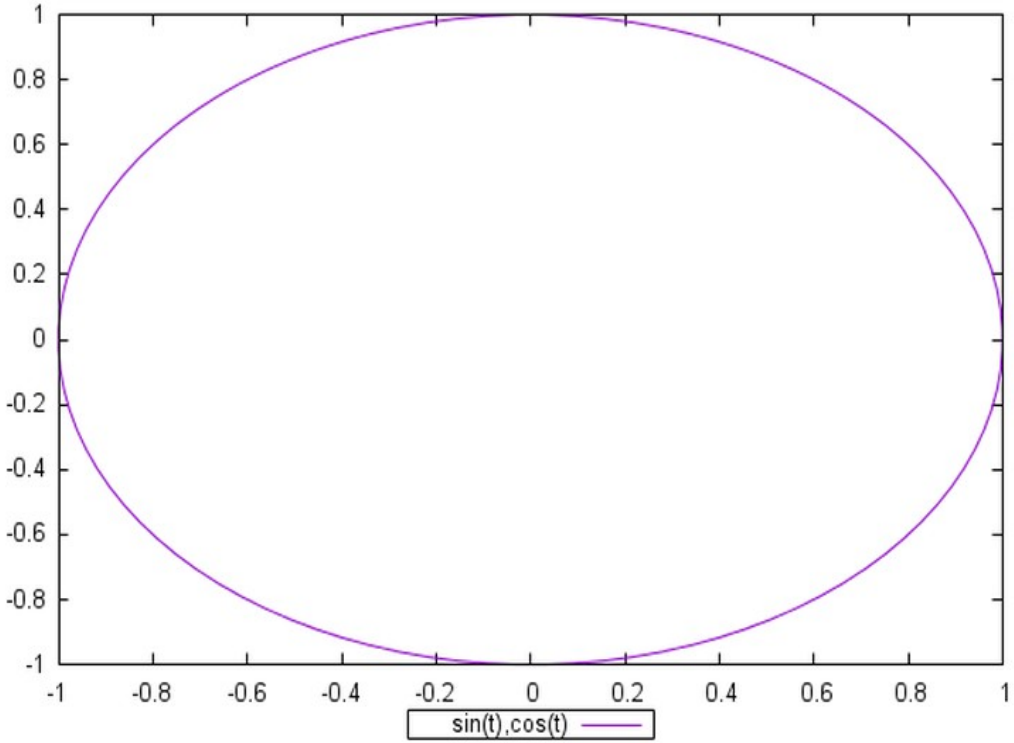

```
# set terminal png transparent nocrop enhanced size 450,320 font "arial,8"
# set output 'fillcrvs.1.png'
set key outside right top vertical Right noreverse enhanced autotitle nobox
set title "plot with filledcurve [options]"
plot [-10:10] [-5:3]    1.5+sin(x)/x with filledcurve x2,       sin(x)/x with filledcurve,      1+sin(x)/x with lines,
-1+sin(x)/x with filledcurve y1=-2,     -2.5+sin(x)/x with filledcurve xy=-5,-4.,       -4.3+sin(x)/x with filledcurve
x1,     (x>3.5 ? x/3-3 : 1/0) with filledcurve y2
```

Gnuplot: Ejemplos



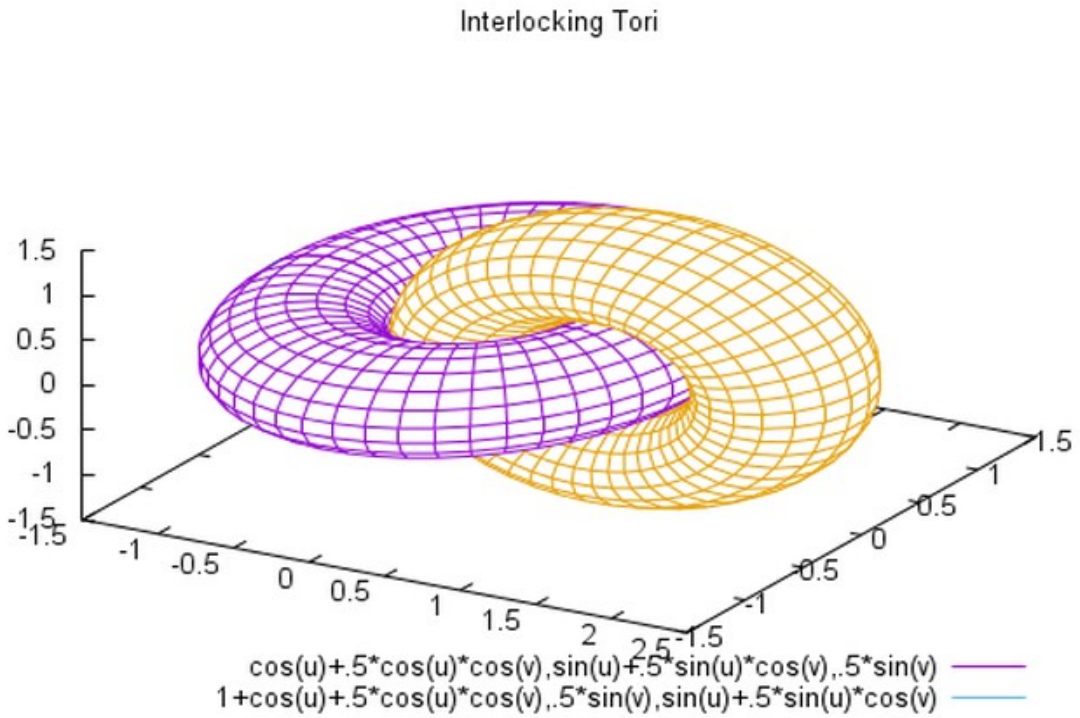

```
# set terminal png transparent nocrop enhanced size 450,320 font "arial,8"
# set output 'histograms.2.png'
set boxwidth 0.9 absolute
set style fill   solid 1.00 border lt -1
set key inside right top vertical Right noreverse noenhanced autotitle nobox
set style histogram clustered gap 1 title textcolor lt -1
set datafile missing '-'
set style data histograms
set xtics border in scale 0,0 nomirror rotate by -45  autojustify
set xtics  norangelimit
set xtics   ()
set title "US immigration from Northern Europe\nPlot selected data columns as histogram of clustered boxes"
set yrange [ 0.00000 : 300000. ] noreverse nowriteback
x = 0.0
i = 22
## Last datafile plotted: "immigration.dat"
plot 'immigration.dat' using 6:xtic(1) ti col, '' u 12 ti col, '' u 13 ti col, '' u 14 ti col
```

Gnuplot: Ejemplos



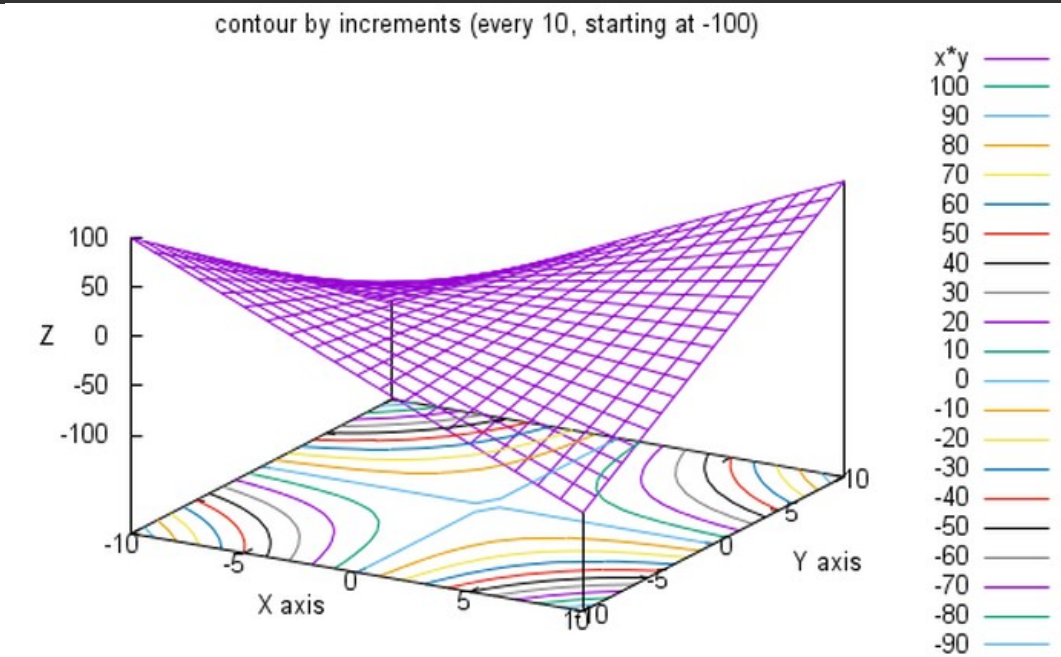

```
# set terminal png transparent nocrop enhanced size 450,320 font "arial,8"
# set output 'param.3.png'
set dummy t, y
set key bmargin center horizontal Right noreverse enhanced autotitle box lt black linewidth 1.000 dashtype solid
set parametric
set samples 160, 160
set style data lines
plot sin(t),cos(t)
```

Gnuplot: Ejemplos



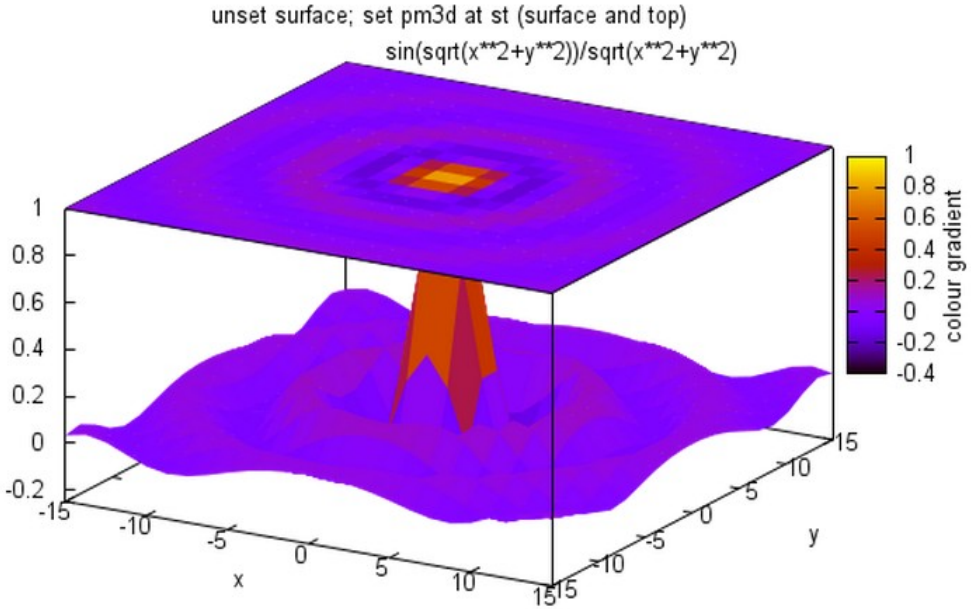

```
# set terminal png transparent nocrop enhanced size 450,320 font "arial,8"
# set output 'surface2.9.png'
set dummy u, v
set key bmargin center horizontal Right noreverse enhanced autotitle nobox
set parametric
set view 50, 30, 1, 1
set isosamples 50, 20
set hidden3d back offset 1 trianglepattern 3 undefined 1 altdiagonal bentover
set style data lines
set ticslevel 0
set title "Interlocking Tori"
set urange [ -3.14159 : 3.14159 ] noreverse nowriteback
set vrange [ -3.14159 : 3.14159 ] noreverse nowriteback
splot cos(u)+.5*cos(u)*cos(v),sin(u)+.5*sin(u)*cos(v),.5*sin(v) with lines,      1+cos(u)+.5*cos(u)*cos(v),.5*sin(v),sin(u)+.5*sin(u)*cos(v) with lines
```

Gnuplot: Ejemplos



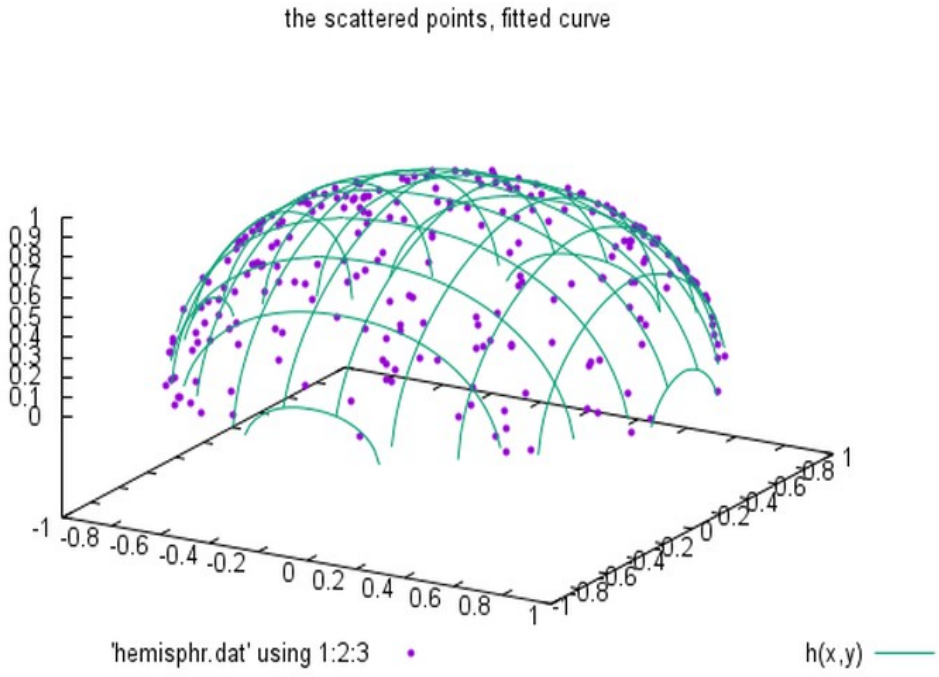

```
# set terminal png transparent nocrop enhanced size 450,320 font "arial,8"
# set output 'contours.3.png'
set key at screen 1, 0.9, 0 right top vertical Right noreverse enhanced autotitle nobox
set style textbox opaque margins  0.5,  0.5 noborder
set view 60, 30, 0.85, 1.1
set samples 20, 20
set isosamples 21, 21
set contour base
set cntrparam levels incremental -100,10,110
set style data lines
set title "contour by increments (every 10, starting at -100)"
set xlabel "X axis"
set ylabel "Y axis"
set zlabel "Z "
set zlabel  offset character 1, 0, 0 font "" textcolor lt -1 norotate
splot x*y
```

Gnuplot: Ejemplos



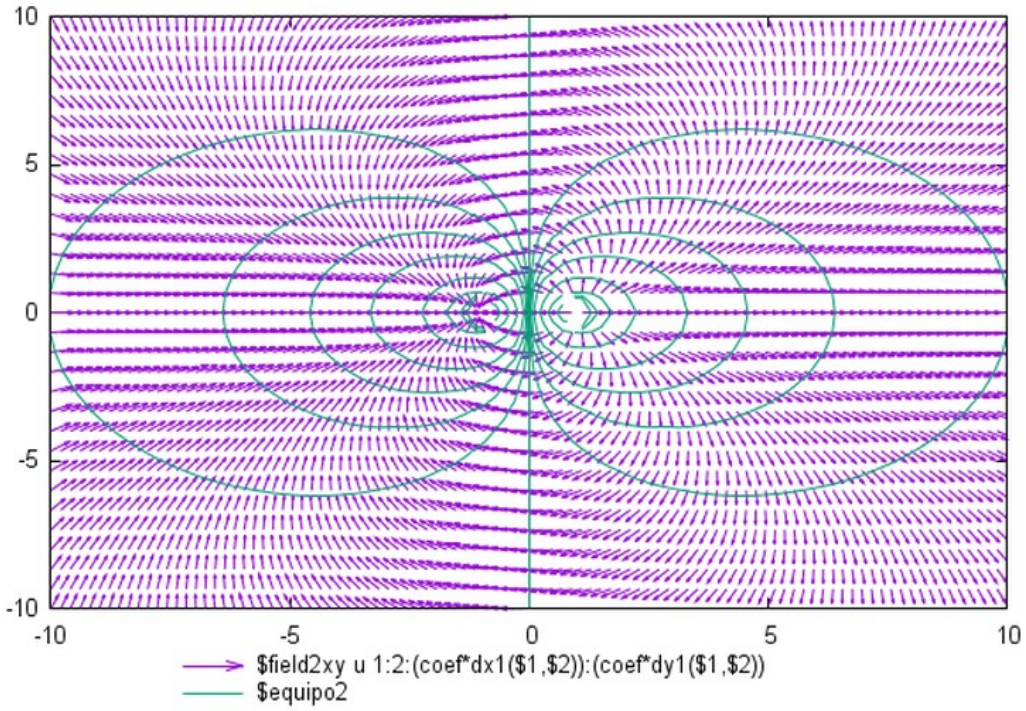

```
# set terminal png transparent nocrop enhanced size 450,320 font "arial,8"
# set output 'pm3d.4.png'
set border 4095 front lt black linewidth 1.000 dashtype solid
set samples 25, 25
set isosamples 20, 20
unset surface
set style data lines
set ticslevel 0
set title "unset surface; set pm3d at st (surface and top)"
set xlabel "x"
set xrange [ -15.0000 : 15.0000 ] noreverse nowriteback
set ylabel "y"
set yrange [ -15.0000 : 15.0000 ] noreverse nowriteback
set zrange [ -0.250000 : 1.00000 ] noreverse nowriteback
set cblabel "colour gradient"
set pm3d implicit at st
splot sin(sqrt(x**2+y**2))/sqrt(x**2+y**2)
```

Gnuplot: Ejemplos




```
# set terminal png transparent nocrop enhanced size 450,320 font "arial,8"
# set output 'fit.8.png'
set key bmargin center horizontal Right noreverse enhanced autotitle nobox
set title "the scattered points, fitted curve"
set fit brief errorvariables nocovariancevariables errorscaling noprescale nowrap v5
l(x) = y0 + m*x
high(x) = mh*(x-Tc) + dens_Tc
lowlin(x)  = ml*(x-Tc) + dens_Tc
curve(x) = b*tanh(g*(Tc-x))
density(x) = x < Tc ? curve(x)+lowlin(x) : high(x)
h(x,y) = sqrt(r*r - (abs(x-x0))**2.2 - (abs(y-y0))**1.8) + z0
myencoding = "utf8"
y0 = 0.2
m = -0.000943519626924529
GPFUN_l = "l(x) = y0 + m*x"
x = 0.0
FIT_CONVERGED = 1
FIT_NDF = 245
FIT_STDFIT = 0.0180887832084403
FIT_WSSR = 0.0801649991006786
FIT_P = 1.0
FIT_NITER = 50
y0_err = 0.000473544839517863
m_err = 3.15383626024729e-05
ml = -0.00103152542276233
mh = -0.0008340717673769
dens_Tc = 1.02499621370905
Tc = 46.0665367045608
g = 6.92493866108287
b = 0.00139548391000006
GPFUN_high = "high(x) = mh*(x-Tc) + dens_Tc"
GPFUN_lowlin = "lowlin(x)  = ml*(x-Tc) + dens_Tc"
GPFUN_curve = "curve(x) = b*tanh(g*(Tc-x))"
GPFUN_density = "density(x) = x < Tc ? curve(x)+lowlin(x) : high(x)"
ml_err = 1.62623230565094e-05
mh_err = 3.737890801507e-06
dens_Tc_err = 7.27819513635249e-06
Tc_err = 0.00159887430059728
g_err = 0.429342070879149
b_err = 5.81804522574664e-05
r = 0.5
x0 = 0.1
z0 = 0.3
GPFUN_h = "h(x,y) = sqrt(r*r - (abs(x-x0))**2.2 - (abs(y-y0))**1.8) + z0"
r_err = 0.000364063036513251
x0_err = 0.000392881045327825
z0_err = 0.00152588271554302
## Last datafile plotted: "hemisphr.dat"
splot 'hemisphr.dat' using 1:2:3, h(x,y)
## fit h(x,y) 'hemisphr.dat' using 1:2:3 via r, x0, y0, z0
```

Gnuplot: Ejemplos




```
# set terminal png transparent nocrop enhanced size 450,320 font "arial,8"
# set output 'vector.3.png'
set key bmargin center horizontal Left reverse enhanced autotitle nobox
set isosamples 31, 31
set rrange [ 0.00000 : 10.0000 ] noreverse nowriteback
set trange [ -5.00000 : 5.00000 ] noreverse nowriteback
set urange [ -5.00000 : 5.00000 ] noreverse nowriteback
set vrange [ -5.00000 : 5.00000 ] noreverse nowriteback
set xrange [ -10.0000 : 10.0000 ] noreverse nowriteback
set x2range [ -10.0000 : 10.0000 ] noreverse nowriteback
set yrange [ -10.0000 : 10.0000 ] noreverse nowriteback
set y2range [ -10.0000 : 10.0000 ] noreverse nowriteback
set zrange [ -10.0000 : 10.0000 ] noreverse nowriteback
set cbrange [ -10.0000 : 10.0000 ] noreverse nowriteback
set paxis 1 range [ 0.00000 : 1.00000 ] noreverse nowriteback
set paxis 2 range [ 0.00000 : 1.00000 ] noreverse nowriteback
set paxis 3 range [ 0.00000 : 1.00000 ] noreverse nowriteback
set paxis 4 range [ 0.00000 : 1.00000 ] noreverse nowriteback
set paxis 5 range [ 0.00000 : 1.00000 ] noreverse nowriteback
set paxis 6 range [ 0.00000 : 1.00000 ] noreverse nowriteback
set paxis 7 range [ 0.00000 : 1.00000 ] noreverse nowriteback
r(x,y)=sqrt(x*x+y*y)
v1(x,y)=  q1/(r((x-x0),y))
v2(x,y)=  q2/(r((x+x0),y))
vtot(x,y)=v1(x,y)+v2(x,y)
e1x(x,y)= q1*(x-x0)/r(x-x0,y)**3
e1y(x,y)= q1*(y)/r(x-x0,y)**3
e2x(x,y)= q2*(x+x0)/r(x+x0,y)**3
e2y(x,y)= q2*(y)/r(x+x0,y)**3
etotx(x,y)=e1x(x,y)+e2x(x,y)
etoty(x,y)=e1y(x,y)+e2y(x,y)
enorm(x,y)=sqrt(etotx(x,y)*etotx(x,y)+etoty(x,y)*etoty(x,y))
dx1(x,y)=coef*etotx(x,y)/enorm(x,y)
dy1(x,y)=coef*etoty(x,y)/enorm(x,y)
dx2(x,y)=coef*etotx(x,y)
dy2(x,y)=coef*etoty(x,y)
GPFUN_r = "r(x,y)=sqrt(x*x+y*y)"
q1 = 1
x0 = 1.0
GPFUN_v1 = "v1(x,y)=  q1/(r((x-x0),y))"
q2 = -1
GPFUN_v2 = "v2(x,y)=  q2/(r((x+x0),y))"
GPFUN_vtot = "vtot(x,y)=v1(x,y)+v2(x,y)"
GPFUN_e1x = "e1x(x,y)= q1*(x-x0)/r(x-x0,y)**3"
GPFUN_e1y = "e1y(x,y)= q1*(y)/r(x-x0,y)**3"
GPFUN_e2x = "e2x(x,y)= q2*(x+x0)/r(x+x0,y)**3"
GPFUN_e2y = "e2y(x,y)= q2*(y)/r(x+x0,y)**3"
GPFUN_etotx = "etotx(x,y)=e1x(x,y)+e2x(x,y)"
GPFUN_etoty = "etoty(x,y)=e1y(x,y)+e2y(x,y)"
GPFUN_enorm = "enorm(x,y)=sqrt(etotx(x,y)*etotx(x,y)+etoty(x,y)*etoty(x,y))"
coef = 0.7
GPFUN_dx1 = "dx1(x,y)=coef*etotx(x,y)/enorm(x,y)"
GPFUN_dy1 = "dy1(x,y)=coef*etoty(x,y)/enorm(x,y)"
GPFUN_dx2 = "dx2(x,y)=coef*etotx(x,y)"
GPFUN_dy2 = "dy2(x,y)=coef*etoty(x,y)"
xmin = -10.0
xmax = 10.0
ymin = -10.0
ymax = 10.0
x = 0.0
## Last datafile plotted: "$equipo2"
plot $field2xy u 1:2:(coef*dx1($1,$2)):(coef*dy1($1,$2)) w vec,      $equipo2 w l
```

Gnuplot: Ejemplos

El potencial de gnuplot para hacer representaciones gráficas es enorme, y como muestra presentamos algunos ejemplos que se pueden encontrar en:

http://www.gnuplotting.org/

Gnuplot: Ejemplos