Gnuplot OX server Manual

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OpenXM.org

1 GNUPLOT Functions

This chapter describes interface functions for GNUPLOT ox server `ox_sm1_gnuplot`. These interface functions are defined in the file `gnuplot`. The file `gnuplot.rr` is at `$(OpenXM_HOME)/lib/asir-contrib`.

```
[255] gnuplot.start();
0
[257] gnuplot.gnuplot("plot sin(x**2);");
0
```

The function `gnuplot.heat`(*dt*,*step*) demonstrates our gnuplot interface. It numerically solves the heat equation

$$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}, \quad u(t,0) = u(t,1) = 1$$

with the initial condition

$$u(0,x) = x, \ (0 \le x \le 0.5), \quad u(1,x) = 1 - x, \ (0.5 \le x \le 1)$$

by the explicit scheme for $0 \le t \le dt * step$. The segment [0,1] is devided into `Heat_N` segments. The static variable `Heat_N` can be set by the function `gnuplot.heat_set_N`. If the celebrated Courant-Friedrichs-Levi number *dt**`Heat_N`*`Heat_N` is less than or equal to 0.5, then the explicit scheme is numerically stable. One can observe the instability by changing CFL number.

```
gnuplot.heat_set_N(20); gnuplot.heat(0.001,30);   (CFL number is 0.4)
gnuplot.heat_set_N(20); gnuplot.heat(0.003,30);   (CFL > 0.5 unstable)
```

Author of `GNUPLOT`: Thomas Williams, Colin Kelley. `http://www.gnuplot.info`

1.1 Functions

1.1.1 gnuplot.start

`gnuplot.start()`
:: Start `ox_sm1_gnuplot` on the localhost.

return Integer

- Start `ox_sm1_gnuplot` on the localhost. It returns the descriptor of `ox_sm1_gnuplot`.
- Set `Xm_noX = 1` to start `ox_sm1_gnuplot` without a debug window.
- The descriptor is stored in `Gnuplot_proc`.

```
P = gnuplot.start();
```

`Reference`
`ox_launch`, `gnuplot`

1.1.2 gnuplot

`gnuplot.gnuplot(`*s*`|proc=`*p*`)`
:: Ask GNUPLOT to execute the command string *s*.

return Void

p Number

s String

- The server executes the gnuplot command *s*. When an error occurs, the gnuplot itself terminates and ox_sm1_gnuplot server automatically restarts gnuplot.
- gnuplot does not accept a long polynomial.
- gnuplot does not accept `^`. Use `**` instead.

```
[232] P = gnuplot.start();
0
*Plot 3 dimensional graph.
[233] gnuplot.gnuplot("splot x**2-y**2;"|proc=P);
0
*Plot 2 dimensional graph.
[234] gnuplot.gnuplot("plot [-pi:pi] [-2:2] cos(x);");
0
*Output a graph as a postscript figure.
[235] gnuplot.output(|file="hoge.eps");
0
[236] gnuplot.gnuplot("plot sin(x)*cos(x);");
0
[237] gnuplot.gnuplot(|file="x11");
0

*Plot 3 dimensional graph hiding unvisible lines.
[236] gnuplot.gnuplot("set hidden3d");
0
[237] gnuplot.gnuplot("splot (x**2+y**2)*sin(x**2+y**2)");
0
[238] gnuplot.gnuplot("set isosamples 50");
0
[239] gnuplot.gnuplot("splot (x**2+y**2)*sin(x**2+y**2)");
```

`Reference`
`ox_launch`, `gnuplot.start`, `rtostr`, `gnuplot.plot_dots`

`Reference Book`
Yabuki Michiro, Otake Tuyoshi; Tukai konasu GNUPLOT, Techno Press, in Japansese, ISBN4-924998-11-7

1.1.3 gnuplot.plot_dots

`gnuplot.plot_dots(`*d*`,`*s*`|proc=`*p*`)`
:: Plot the dots *d* with the style *s*.

return Void

p Number

d List

s String or 0

- Plot the dots *d* with the style *s*. *s* is a string of the form "style color point". Here, style can be lines, points, linespoints, impulses, dots, steps, errorbars, boxes, boxerrorbars. color can be 1 (red), 2 (green), 3 (blue), 4, ... , 8. point can be a number from 1 to 8. The color and point field can be omitted.
- When *d* == [ ], the screen will be cleared.

```
[239] P = gnuplot.start();
0
[240] gnuplot.plot_dots([ ],0);
0
[241] for (I=0; I<10; I++) gnuplot.plot_dots([[I,I^2]]," lines ");
[242] A = [ ];
[]
[243] for (I=0; I<10; I++) A = append(A,[ [I,I^2]]);
[244] A;
[[0,0],[1,1],[2,4],[3,9],[4,16],[5,25],[6,36],[7,49],[8,64],[9,81]]
[245] gnuplot.plot_dots(A," lines ");
0
```

Reference
: gnuplot.start, plot "fileName" with options(GNUPLOT command), gnuplot.clean, gnuplot

1.1.4 gnuplot.heat

gnuplot.heat(*dt*,*step*)
: :: It solves the heat equation numerical and plots solutions

return Void

dt floating point number

step Integer

- It solves the heat equation du/dt = d^2 u/dx^2, u(t,0) = u(t,1) = 0 with the initial condition u(0,x) = x (0 <= x <= 0.5), u(0,x) = 1-x (0.5 <= x <= 1.0).
- Heat_N is the number of the meshes in the space.
- This function will be called pde_heat_demo in a future.

Algorithm: NOT Written. (Difference scheme. Courant-Levi-Friedrichs conditions.)

```
[232] gnuplot.set_heat_N(20)$
[233] gnuplot.heat(0.001,30)$
```

1.1.5 gnuplot.output

`gnuplot.output(|`*`file=s`*`)`
:: ask `GNUPLOT` to output graphic to the file *s* in the Postscript format.

return Void

s String

- ask `GNUPLOT` to output graphic to the file *s* in the Postscript format.
- When `s` is "x11" or this function is called without the argument, the output will be written to X11 display.

```
[273] gnuplot.output(|file="hoge.eps");
Graphic output of GNUPLOT will be written to hoge.eps as a Poscript file.
0
[274] gnuplot.gnuplot("plot tan(x)+sin(x);");
0
[275] gnuplot.output();
Usage of gnuplot.output: gnuplot.output(|file="string")
                         gnuplot.output(|file="x11")
Output device is set to X11
```

`Reference`
`gnuplot`

1.1.6 gnuplot.plot_function

`gnuplot.gnuplot(`*`f`*`|proc=`*`p`*`)`
:: ask the `gnuplot` server to draw a graph of *f*

return Void

p Number

f Polynomial or a list of polynomials

- ask the `gnuplot` server to draw a graph of *f*

```
[290] gnuplot.plot_function((x+sin(x))^2);
0
[291] gnuplot.plot_function([x,x^2,x^3]);
0
```

`Reference`
`gnuplot.to_gnuplot_format`

1.1.7 gnuplot.stop

`gnuplot.stop()`
:: Stop the gnuplot and remove the temporary fifo file.

return Void

s String

- Stop the `GNUPLOT` and remove the temporary fifo file generated by the mkfifo system call under the temporary directory.

```
     [273] gnuplot.stop()
```

Reference

gnuplot.start

1.1.8 gnuplot.setenv

gnuplot.setenv(*key*,*value*)

::

return Void

key String

value Object

- The *key* takes the value either in "gnuplot.callingMethod" or "plot.gnuplotexec".

```
   Use the old method to communicate with gnuplot (version 3).
   This method does not use mkfifo, but we need a patched version of gnuplot.
 [273] gnuplot.setenv("gnuplot.callingMethod",0);
 [274] gnuplot.setenv("plot.gnuplotexec",getenv("OpenXM_HOME")+"/bin/gnuplot4ox");

   Calling your own gnuplot binary.
 [274] gnuplot.setenv("plot.gnuplotexec","/cygdrive/c/program files/gnuplot/pgnuplot
```

Reference

gnuplot.start

Index

(Index is nonexistent)

(Index is nonexistent)

Short Contents

Table of Contents