Gnuplot & Differential System

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Gnuplot: what is?

- portable command-line graphics utility
- it is for Linux, Windows, Macintosh
- there is a copyright but it is freely distributed
- it has been supported and developed since 1986
- it visualizes mathematical functions and data ...

Gnuplot: use

- Italian user-guide `http://www.mat.uniroma1.it/centro-calcolo/manuali/gnuplot/gnuplot.pdf`: for beginners
- English user-guide `http://www.gnuplot.info/docs_4.6/gnuplot.pdf`: for expert users
- start: digit “gnuplot” on shell on Linux, click on icon on Windows
- a blinking cursor highlights the command line
- comments are indicated by #
- the statements are similar to Fortran, C, Pascal or Basic

Gnuplot: View a function

- View the function
$$f(x) = \ln\left(\frac{x}{1-x}\right)$$
- define the function `f(x)=log(x/(1-x))`
- print the function `plot f(x)`
- the function is defined between (0,1), so it is need to limit the range
- `set xrange [0:1]`
- the type or the width of the line is setted by the commands at the end of the plot line command
`line width "n"` and `line type "n"`
where n is an integer

Gnuplot: View data

- data file format is made by columns
- the main command is
  `plot 'file_name' using nx_col:ny_col with line/point`
- it is possible to use abbreviations
  `p 'file_name' u n_col:n_col w l/p/lp`
- `nx_col` and `ny_col` are integers referring to the column to visualize
- the first refers to the x axes the second to the y axes
- it is possible to save the commands on a file
  `save 'name.gnu'`, that can be modified with any editor
- it is possible to load saved file the command is
  `load 'name.gnu'`

Data-set fitting

- It is possible to fit data-set via a known function
- three steps are necessary:

1. define the fitting function:

$$f(x) = a * x^b$$

   by the command: `f(x)=a*x**b`
2. perform the fitting by means the command:
   `fit [start:end] f(x) 'file_name' u nx_col:ny_col via a,b`
3. plot the function on the data:
   `rep f(x)`

Save a figure from gnuplot plot

- to save a figure starting from a gnuplot plot it is necessary to execute this commands in gnuplot environment or to write them on the file '.gnu' saved as in the previuos slide:

```
1 # File name: save.plt - saves a Gnuplot plot as a PostScript
      file
2 # to save the current plot as a postscript file issue the
      commands:
3 set size 2.,1.
4 set terminal postscript portrait enhanced color dashed lw 6 "
      Helvetica" 40
5 set output "file_name.eps"
6 replot
7 set terminal x11
8 set size 2.,1.
```