

NAME

xppaut – X Phase plane plus AUTO. Solves many kinds of equations.

SYNOPSIS

```
xppaut [-silent] [-xorfix] [-convert]
        [-newseed] [-ee] [-allwin]
        [-white] [-setfile file] [-runnow]
        [-bigfont font] [-smallfont font] [-parfile file]
        [-outfile file] [-icfile file] [-grads boolean] [-bell boolean]
        [-forecolor color] [-backcolor color] [-backimage image]
        [file...]
```

DESCRIPTION

xppaut is a tool for solving:

- differential equations
- difference equations
- delay equations
- functional equations
- differential-algebraic equation
- boundary value problems
- stochastic equations

The code brings together a number of useful algorithms and is written in C. All the graphics and interface are created using the X Window System protocol client library Xlib <<http://www.xfree86.org>>.

xppaut capabilities:

- Handles up to 1800 differential equations.
- There are over a dozen solvers including several for stiff systems, a solver for integral equations and a symplectic solver
- Up to 10 graphics windows can be visible at once and a variety of color combinations is supported
- PostScript output is supported as well as GIF and animated GIF movies
- Post processing is easy and includes the ability to make histograms, FFTs and applying functions to columns of data
- Equilibria and linear stability as well as one-dimensional invariant sets can be computed
- Nullclines and flow fields aid in the qualitative understanding of two-dimensional models
- Poincare maps and equations on cylinders and tori are also supported
- Some useful averaging theory tricks and various methods for dealing with coupled oscillators
- Equations with Dirac delta functions are allowable
- Animations of simulations such as a little pendulum moving back and forth or lamprey swimming
- A curve-fitter based on the Marquardt-Levenberg algorithm which lets you fit dynamical systems to data
- Generate "movies" of three-dimensional views of attractors or parametric changes in the attractor as some parameters vary
- Dynamically link to external subroutines

OPTIONS

- silent** Batch run without the interface and dump solutions to a file
- xorfix** Work-around for exclusive Or with X on some monitors/graphics setups
- convert**
Convert old style ODE files (e.g. phaseplane) to new ODE style
- newseed**
Randomizes the random number generator which will often use the same seed
- ee**
Emulates shortcuts of Evil Empire style (MS)

- allwin**
Brings XPP up with all the windows visible
- white**
Swaps foreground and background colors
- setfile** *filename*
Loads the set file before starting up
- runnow**
Runs ode file immediately upon startup (implied by -silent)
- bigfont** *font*
Use the big font whose filename is given
- smallfont** *font*
Use the small font whose filename is given
- parfile** *filename*
Load parameters from the named file
- outfile** *filename*
Send output to this file (default is output.dat)
- icfile** *filename*
Load initial conditions from the named file
- forecolor** *color*
Hexadecimal color (e.g. 000000) for foreground
- backcolor** *color*
Hexadecimal color (e.g. EDE9E3) for background
- mwcolor** *color*
Hexadecimal color (e.g. 808080) for main window
- dwcolor** *color*
Hexadecimal color (e.g. FFFFFFF) for drawing window
- backimage** *filename*
Name of bitmap file (.xbm) to tile in background
For example, the following text saved to a file named stipple2.xbm can be loaded to impart a stippled background.

```
#define stipple2_width 2
#define stipple2_height 2
static char stipple2_bits[] = {
    0x02,0x01};
```
- grads** *B*
Color gradients will (B=1) or will not (B=0) be used
- width** *N*
Minimum width in pixels of main window
- height** *N*
Minimum height in pixels of main window
- bell** *B* System bell on events will (B=1) or will not (B=0) be used
- internset** *B*
Internal sets will (B=1) or will not (B=0) be run during batch run

ENVIRONMENT**XPPHELP**

Path to the XPPAUT documentation file <xpphelp.html> (e.g.

/usr/share/doc/xppaut/html/xpphelp.html)

XPPBROWSER

Web browser to view documentation (e.g. /usr/bin/firefox)

FILES

Each user can customize the behavior and appearance of Xppaut via the file “\$HOME/.xpprc”. Where the environment variable \$HOME points to the user’s home directory. On most systems \$HOME will already be set. Each option line in .xpprc begins with the “@” symbol followed by a comma-separated list of options. Comment lines begin with the “#” symbol and are ignored.

```
# Example .xpprc file
@ maxstor=50000
@ meth=qualrk,tol=1e-6,atol=1e-6
#Set up a customized look
@ but=quit:fq,bell=1
@ bigfont=lucidasanstypewriter-bold-14,grads=1
# thats it
```

An list of the extensive options are given below. For complete description of each of these options the reader is referred to the technical documentation for Xppaut.

ATOL, AUTOEVAL, AUTOVAR, AUTOXMAX, AUTOXMIN, AUTOYMAX, AUTOYMIN, AXES, BACK, BACKCOLOR, BACKIMAGE, BANDLO, BANDUP, BELL, BIGFONT, BOUND, BUT, COLORMAP, DELAY, DLL_FUN, DLL_LIB, DS, DSMAX, DSMIN, DT, DTMAX, DTMIN, DWCOLOR, EPSL, EPSS, EPSU, FOLD, FORECOLOR, GRADS, HEIGHT, JAC_EPS, LT, MAXSTOR, METH, MWCOLOR, NCOL, NEWT_ITER, NEWT_TOL, NJMP, NMAX, NMESH, NORMMAX, NORMMIN, NPLOT, NPR, NTST, OUT, OUTPUT, PARMAX, PARMIN, PHI, POIMAP, POIPLN, POISGN, POISTOP, POIVAR, PS_COLOR, PS_FONT, PS_FSIZE, PS_LW, RANGE, RANGEHIGH, RANGELOW, RANGEOLDIC, RANGEOVER, RANGERESET, RANGESTEP, RUNNOW, SEED, SMALLFONT, SMC, STOCH, T0, THETA, TOL, TOR_PER, TOTAL, TRANS, UMC, VMAXPTS, WIDTH, XHI, XLO, XMAX, XMIN, XNC, XP#, YHI, YLO, YMAX, YMIN, YNC, YP#, ZMAX, ZMIN, ZP#,

HELP

Note: On typical X Window installations the command *xlsfonts* lists available fonts. For example, the following command lists only the available fixed width fonts:

```
xlsfonts | grep -i -e "typewriter" \
-e "mono" -e "[0-9]x[0-9]" \
-e "fixed" -e "-c-" -e "-m-" | sort
```

Note: For a listing of standard hexadecimal colors see <http://en.wikipedia.org/wiki/Web_colors>.

AUTHOR

This manual page was written by Isaac Jones <ijones@syntaxpolice.org>, for the Debian GNU/Linux system on March 4, 2002. This man page was updated by D. P. Dougherty on Jan 4, 2011.