

## UNIX style installation of the DISCUS/DIFFEV/KUPLOT/DISCUS\_SUITE software with CYGWIN

### Preparation:

Install a basic CYGWIN64 or CYGWIN on your computer. To be found at  
“[www.cygwin.com](http://www.cygwin.com)”

The compilation requires several libraries, especially their development versions, not all of them may be installed automatically. Some of these libraries might be present on your system with different version numbers or slightly different names/paths, please be flexible:

cmake	! Nice make setup
cmake-gui	
gcc-core	! Gnu Compiler
gcc-gfortran	! Fortran compiler
gcc-g++	! C++ compiler
make	! The gnu make utility
gcmakedep	! Make Dependency tool
libreadline-devel	! Readline development version
libreadline7	! Needed for command editing, Version 7 or higher
libpng-devel	! PNG Graphics library
libpng16-devel	! PNG Graphics library Version 16 or current highest...
libpng16	! PNG run time library Version 16 or current highest...
libX11-devel	! X11 development library
libX11_6	! X11 core library
xterm	! X-window program
xinit	! X11 startup
libXm4	
libXRes-1	
zlib-devel	! gzip compression Check that zip.exe and unzip.exe are in /bin
ghostscript	
openmpi	! DIFFUSE needs this for parallel processing
libopenmpi-devel	! DIFFUSE needs this for parallel processing
openssh	! DIFFUSE needs this for parallel processing

### Optional Libraries

Python

NeXuS ! In the future DISCUS will use this for 3D data

### Mandatory development tools:

ccmake, make

gcc

gfortran ! At least Version 4.6

CYGWIN will install a lot more to resolve dependencies, please be generous.

Among those check that cygwin includes:

binutils ! Basic GNU assembler, linker...

cygwin-devel ! Basic Cygwin develop utilities

libncursesw10 ! Terminal display library  
libpng-devel ! PNG Graphics library development version  
libXau6 ! X11 authority  
libXau-devel ! X11 authority development version  
libXmu6 ! X11 miscellaneous utilities

Despite the various internet sites, the post processing of cygwin tends to be very slow.

So once you get to the

z/perpatual

Op\_000\_autorebase.dash

screen, please be patient.

Once the installation is finished, you will have a linux system running on your computer.

Double click the cygwin icon and a simple text window will open up. Within the window a right-click on your mouse allows you to set options like foreground and background colors, the font size etc.

See the UNIX section for a very short introduction.

## Installation:

### Quick Installation

Copy the current DISCUS\_INSTALLATION\_CYGWIN.tar.gz to your home directory

```
cp /cygdrive/c/Users/your_name/Downloads/DISCUS_INSTALLATION_CYGWIN.tar.gz $HOME
```

If necessary adjust the source path...

Unpack this archive:

```
cd $HOME
tar -zxf DISCUS_CYGWIN.tar.gz
```

This will create a directory DISCUS\_INSTALL.

Copy the current source code archive into this directory

The archive is called DiffuseCode-V.M.P.tar.gz, where V.M.P stands for the major Version, the Minor version and the Patch numbers, currently 5.20.0

```
cd $HOME/DISCUS_INSTALL
cp /cygdrive/c/Users/your_name/Downloads/DiffuseCode-5.20.0.tar.gz .
cp /cygdrive/c/Users/your_name/Downloads/pgplot5.2.4.tar.gz
```

Install PGPLOT by running the shell script pgplot\_cygwin.sh:

```
./pgplot_cygwin.sh
```

If all libraries were installed properly this will -hopefully- run without errors.

As I do not want to mess with your system files, please edit manually the file “/etc/profile.d/profile.local”. If this file does not exist, copy the file profile.local into the /etc/profile.d folder.:

```
cp $HOME/DISCUS_INSTALL/profile.local /etc/profile.d/
```

If the file exists, then add the following lines the end of the file:

```
PGPLOT_DIR=/usr/local/pgplot
PGPLOT_DEV=/XWINDOW
PGPLOT_FONT=/usr/local/pgplot/grfont.dat
export PGPLOT_DIR
export PGPLOT_DEV
export PGPLOT_FONT
```

Edit your local "\$HOME/.bashrc", add at end:

```
source /etc/profile.d/profile.local
```

See the section editor further down with hints on editing a file within unix.

To ensure that these environment variables are set, start a new cygwin terminal.

Now go back to the DISCUS\_INSTALL directory and start the main discus installation:

```
cd $HOME/DISCUS_INSTALL  
./install_discus DiffuseCode-5.20.0.tar.gz
```

The argument to the script install\_discus.sh must be the current source code archive.

This should install the programs discus, kuplot, mixscat, discus\_suite into the directory /usr/local/bin

you can start the stand alone programs DISCUS and DIFFEV by typing their name in small letters at any prompt:

```
discus
```

To start kuplot or the recommended suite type :

```
discus_suite.sh  
kuplot.sh
```

Best define an alias within your \$HOME/.bashrc:

```
alias discus_suite=/bin/discus_suite.sh  
alias kuplot=/bin/kuplot.sh
```

Enjoy !

If errors might occur, try to check with the more detailed instructions on the following pages.

## Editors:

If you do not feel comfortable with the unix editor “vi”, you can actually use your favorite Windows based editor program like wordpad or notepad++. Do NOT use OpenOffice or other text processing utilities. If you use wordpad, keep in mind that this is a Windows type program which does not entrust you with any intelligence of your own and usually attempts to add an extension “.txt” to the file. You do not want this to happen. Something like notepad++ or similar editor programs do a much better job.

If installed under the default path you will find all of the cygwin stuff at:

`c:\cygwin`      or  
`c:\cygwin64`

Your user files will be in the folder “home” and then your Windows account name. Your home directory will therefore be:

`c:\cygwin64\home\YOUR_NAME`

with YOUR\_NAME properly replaced.

Notepad++ does recognize the presence of hidden files i.e. files that start with a dot : “.”

System files will be in all of the other folders, be careful!

## UNIX:

### Important Unix commands

- `man <command>`  
Display information(=manual) for command <command>
- `info <command>`  
Display information for command <command>, modern version
- `ls`  
List the content of a directory
- `cd [<PATH>/]<dirname>`  
Change into another directory
- `cp <from> <to>`  
copy a file from to
- `mkdir [<PATH>/]<dirname>`  
create a new directory
- `rmdir [<PATH>/]<dirname>`  
removes a directory
- `rm <name>`  
removes a file called <name>.

Warning: Unix usually does NOT ask: "do you want to do this?, are you sure?, do you really want to do this?" ! What's gone is gone!

Most of the commands offer many more options. Just try it out, in many cases a parameter "- help" will give a short summary of the available options.

### Examples

<code>ls -a</code>	List all files, that includes hidden files
<code>ls -l</code>	list a long listing that includes many details
<code>ls -R</code>	list recursively into sub directories as well

Unix offers many possibilities to work in a flexible manner with file names:

<code>*</code>	character string of any length
<code>?</code>	exactly one character
<code>[a-z,A-Z]</code>	a character from interval a-z or A-Z. You may provide a single interval as well, and also a range of numbers.

### Examples

<code>ls *.mac</code>	List all files that end in ".mac"
<code>ls data.0[0-9]1</code>	List all files called data.001, data.011, to data.091 files called data.002 etc. are omitted

If you start a program that will open its own window, it is often convenient to add a space and then the "&" sign after the command name as in: "emacs &". This allows you to continue to use the command line window from which you started the program, which would otherwise be blocked by the program.

More detailed installation instructions.

### **PGPLOT Library**

Install the PGPLOT library:

PGPLOT library needs the files:

libpgplot.a  
libpgplot.so  
libcpplot.a  
grfont.dat  
pgxwin\_server

In the directory under the PGPLOT\_INCLUDE\_DIR entry in ccmake you need the files:

cpplot.h  
grpckg1.inc  
pgplot.inc  
pgxwin\_server

Its best to keep these in the same directory as the library, "/usr/local/pgplot"

---

Manual installation of LIBPGPLOT:

Place "pgplot5.2.4.tar.gz" and into your home directory

Create /usr/local/src directory:

```
mkdir -p /usr/local/src
```

Create pgplot directory

```
mkdir -p /usr/local/pgplot
```

Copy pgplot5.2.tar.gz to /usr/local/src

```
cp pgplot5.2.4.tar.gz /usr/local/src
```

Switch to /usr/local/src and unpack the library

```
cd /usr/local/src  
tar -zxf pgplot5.2.tar.gz
```

Switch to /usr/local/pgplot and make the makefile:

```
cd /usr/local/pgplot  
/usr/local/src/pgplot/makemake /usr/local/src/pgplot/makemake linux gfortran_gcc
```

If you have a newer version of the PNG library, then copy some png include files into /usr/local/pgplot. Templates from libpng16 are included in the patch.

```
cp /usr/include/libpng16/png*.h /usr/local/pgplot
cp /usr/include/zlib.h /usr/local/pgplot
cp /usr/include/zconf.h /usr/local/pgplot
```

Run makefile with:

```
make
make cpq
make clean
```

Copy grfont.dat into /usr/local/bin as well:

```
cp /usr/local/pgplot/grfont.dat /usr/local/bin
```

If you use the „bash“ then

Edit/create “/etc/profile.d/profile.local” to contain:

```
PGPLOT_DIR=/usr/local/pgplot
PGPLOT_DEV=/XWINDOW
PGPLOT_FONT=/usr/local/pgplot/grfont.dat
export PGPLOT_DIR
export PGPLOT_DEV
export PGPLOT_FONT
```

Edit your local ".basrc", add at end:

```
source /etc/profile.d/profile.local
```



## Installation DISCUS:

Copy the source code archive to a suitable directory and unpack:

```
mkdir -p $HOME/develop
cp DIFFUSE_CODE_YYYY_MMDD.tar.gz $HOME/develop
cd $HOME/develop
tar -zxf DIFFUSE_CODE_YYYY_MMDD.tar.gz
```

Create a „build“ directory, and change to build directory:

```
mkdir -p $HOME/develop/DiffuseBuild
cd $HOME/develop/DiffuseBuild
```

Execute cmake with source code directory as parameter.  
cmake should open a graphical interface:

```
cmake ../DiffuseCode
```

cmake operates mostly via one letter commands, the main are:

```
c    for configure
e    exit the message screen
g    to generate the make files and exit cmake
```

In cmake toggle OFF the options:

DIFFEV\_MPI, DIFFUSE\_PYTHON, DISCUS\_CUDA, DISCUS\_NEXUS, DISCUS\_OMP

Its best to toggle DIFFEV\_MPI on, but this requires MPI to be installed.

Press „t“ to toggle to advanced mode. Go down with cursor and inspect pgplot settings.

They should point to the directory in which the pgplot library is found:

/usr/local/pgplot OR may be: /usr/local/lib64/pgplot

If you installed the pgplot library as above and created the entries in /etc/profile/profile.local and in \$(HOME)/.bashrc, the pgplot library should be found correctly. Pay attention to the PGPLOT\_DIR entry, as it tends to remain empty!

To edit an entry hit the „Enter key“ then type or change text.

cmake wants an entry for „CMAKE\_BUILD\_TYPE“, edit this field and leave it blank.

Once done hit „c“ to configure cmake

You will get an info screen with hopefully no error messages.

If errors are listed, type „e“ and then „q“ and fix the error

If no errors occur hit „e“ to leave the info screen

Hit „g“ to generate the actual make files and to exit cmake

Then you need to compile the program, type without options

```
make
```

If this worked out without error messages you can install DISCUS, DIFFEV etc.

```
make install
```

To clean up, type

```
make clean
```

Go back to the installation source directory DISCUS\_INSTALL

```
cd $HOME/DISCUS_INSTALL
```

Copy the shell scripts “kuplot.sh” and “discus\_suite.sh” into the global bin directory:

```
cp kuplot.sh /bin/  
cp discus_suite.sh /bin
```

Start a new CYGWIN64 window and you should be able to use discuss, diffev, mixscat simply by typing the corresponding name.

```
discus  
diffev  
mixscat
```

Start kuplot via

```
/bin/kuplot.sh &  
/bin/discus_suite.sh &
```

Alternativley create an alias within your \$HOME/.bashrc:

```
alias kuplot=/bin/kuplot.sh  
alias discus_suite=/bin/discus_suite.sh
```

Enjoy!

Prepare Windows installation ( for development team only)

place "CREATE\_DISCUS64.tar.gz" into your development directory, go there and unpack:

```
cd $HOME/develop  
tar -zxf CREATE_DISCUS64.tar.gz
```

Change to the development directory, run the shell script to create a Windows version

```
cd $HOME/develop/Create_DISCUS64  
./create_discus_64.sh
```

Use Inno setup to create the distribution.