

# **Plotter3D**

Sven Steiniger

<b>COLLABORATORS</b>
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# Chapter 1

## Plotter3D

### 1.1 main

Plotter3D  
Version 1.84

Copyright 1996 by Sven Steiniger

Introduction	What is Plotter3D?
Installation	No Problemo.
System requirements	What's necessary?
Usage	Description.
Autor	Email etc.
Disclaimer	
Distribution	Freeware.
Credits	What was used.
Localization	
About MUI	The GUI.
Extra Tools	Plotter3D:Tools
Index	from A to Z

### 1.2 node\_intro

#### Introduction

Plotter3D was developed to draw three-dimensional functions.  
Therefore its possible to modify functions interactivly and render  
high quality pictures (Modies).  
Besides Plotter3D has a special Realtime mode where the  
function is lighted by a lightsources and you can rotate, scale and move  
the function in realtime.

Supporting graphic-cards (CyberGfx-System) was a main goal during

---

development. Therefore its no problem to draw the preview without any lost of quality direct in 24Bit on a CyberGfx-Screen. Plotter3D still runs without any problems on normal Amigas except that some features need at least Kick V39.

The most Windows of Plotter3D are interactiv, means whenever you change values they are used immediately. Nevertheless you can undo the settings anytime. Its no problem to change the color of a lightsource, draw a preview of the result and you can reject the settings, because the old color looked better.

Besides special features of MUI like BubbleHelp, Drag&Drop, dynamic objects (use as many windows as you want) are used.

## 1.3 node\_install

### Installation

Its recommended to use the Install program that comes with the Plotter3D-package.

To do the installation by hand you simply copy the Plotter3D-directory to an appropriate place and make an assign Plotter3D: to its.  
(assign Plotter3D: "yourpath/Plotter3D")

## 1.4 node\_system

### System requirements

Plotter3D needs:

- Kick V36, recommended V39 or above
- MUI3.6
- for realtime drawing a processor 68020 or above

## 1.5 node\_usage

### Usage

If you use Plotter3D the first you should load some functions (Control-window/Load) and experiment in the Preview-window.

Besides you should have look at Settings-windows

Global  
Preview.

You can find a description of the menu here.  
And a list of the different windowtypes exists here.  
All other pages can be found here.

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## 1.6 node\_author

### Author

Send bugreports, ideas, translations :), comments, nice functions, etc. to

Sven Steiniger

Email: ss37@irz.inf.tu-dresden.de

Note: Currently I am in the Bundeswehr (german army). Therefore I can only read the mails on weekend. Be patient.

## 1.7 node\_localization

### Localization

As english is not my native language you will find a lot of mistakes in this documentation or the catalog. Sorry.

Send me an email if you wanna make a translation into correct english or into another language.

## 1.8 node\_disclaimer

### Disclaimer

I am (the author) not responsible for any damage caused directly or indirectly by this software package.

## 1.9 node\_mui

### MUI

This application uses

MUI - MagicUserInterface

(c) Copyright 1993-96 by Stefan Stuntz

MUI is a system to generate and maintain graphical user interfaces. With the aid of a preferences program, the user of an application has the ability to customize the outfit according to his personal taste.

MUI is distributed as shareware. To obtain a complete package containing lots of examples and more information about registration please look for a file called "muiXXusr.lha" (XX means the latest version number) on your local bulletin boards or on public domain disks.

If you want to register directly, feel free to send

DM 30.- or US\$ 20.-

to

Stefan Stuntz  
Eduard-Spranger-Straße 7  
80935 München  
GERMANY

Support and online registration is available at

<http://www.sasg.com/>

## 1.10 node\_distribution

Distribution

Plotter3D is Freeware.

Means it can be freely distributed as long as no file is modified and all files are kept together. Besides its not allowed to make any Profit with this package.

## 1.11 node\_thanks

Credits

The following programs were used during the development of Plotter3D:

- o AmigaE, an excellent compiler from Wouter van Oortmerssen
- o GoldED, the editor from Dietmar Eilert
- o MUI, the GUI written by Stefan Stuntz
- o FlexCat from Jochen Wiedmann
- o Enforcer from Michael Sinz
- o Sushi from Carolyn Scheppner
  
- o Jerome Chesnot for french translation

## 1.12 node\_tools

Extra tools

Tools/Analyse\_SaveFile

Shows the contents of an file created by Plotter3D.

---

### Tools/ConvertPalette

With this tools you can create new palettes for realtime mode. Plotter3D uses a special format for these palette files which enables simple and fast loading. Name of such a file must end with '.pal256'.

#### Usage:

- press "Load palette" to load a new palette via ASL request. This may either be an IFF file with an Colormap entry or an '.pal256'-palette file. The datas (name, bits per gun and color count) of the loaded palette are shown.
- press "Save IFF palette" to save the palette as IFF file or "Save Plotter3D palette" for an '.pal256'-palette file. An ASL request pops up where you can enter the path and name of this palette. Remember that the name of an Plotter3D palette must end with '.pal256' otherwise its not used!!

#### Notes on palettes:

- the palette must contain 256 colors
- color 0 is background color. Means it should be black. Press "Set color 0 to black" if you are not sure if this is the case.
- color 1 should have lowest intensity and color 255 should have highest intensity

## 1.13 node\_index

Index

## 1.14 node\_menu

Menu

```
Project
  About...
  About MUI...
  -----
  Abort & Quit
  Quit

Settings
  MUI...
  -----
  Global...
  Imagebuttons...
  Preview...
  Realtime...
  -----
  Draw Boundingbox
  Draw Lightsources

Windows
  Render...
```

```
Realtime...
  Informations...
  -----
Complex preview...
Transformation...
  -----
D&D Clipboard...
```

## 1.15 menu\_project\_about

Project/About...

Opens a window with informations about Plotter3D  
With the System-button you can open a new window with actual informations about the system and the internal datas of Plotter3D.

## 1.16 menu\_project\_aboutmui

Project/About MUI...

Opens the standard MUI-About-window.

## 1.17 menu\_project\_abortquit

Project/Abort & Quit

Quits Plotter3D without any safety-requesters. All functions are deleted.

## 1.18 menu\_project\_quit

Project/Quit

Same function as Quit-button in the Control-window.  
Quits Plotter3D, for every unsaved function a safety-requester is shown.

## 1.19 menu\_settings\_mui

Settings/MUI...

Opens the MUI-Configuration-Window for Plotter3D.

---

## 1.20 node\_extrapages

Other pages

- Edit 3D-Function
- Function creation
- Allowed formulas
- Previewtypes
- Boundingbox
- Lightsources
- Colorselection
- SaveFiles

## 1.21 node\_window

Windows

- Lighting
- Render
- D&D Clipboard
- Edit function
- Realtime
- Settings - Imagebuttons
- Settings - Realtime
- Settings - Global
- Settings - Preview
- Functionstype
- Complex Preview
- Control
- Material
- Transformation
- Preview
  - Informations

## 1.22 window\_settings\_stdbuttons

Standard Buttons

Cancel

Closes the Prefs-Window. The settings are not changed.

Use

Closes the Prefs-Window. The actual settings are used by now.

Save

Like Use-Button but the settings are also saved in the directory Plotter3D:Prefs/ and are used everytime you run Plotter3D.

---

## 1.23 window\_settings\_stdmenu

### PopUpMenu

Plotter3D uses Object-specific Popupmenus. More Informations on this topic can be found within the 'Readme'-file of MUI.

#### Defaults/Reset to defaults

Resets the settings to internal default values.

#### Defaults/Last saved

Resets the settings to last saved values.

## 1.24 window\_settings\_global

### Global Settings

#### Monitor aspect

Simply enter the ratio of monitor width to the height.

#### Doublebuffering

Determines how the preview is shown. If you draw directly into the window you see a strong flickering. Therefore Plotter3D has several methods to avoid this:

##### None

Switchs buffering off. Because of the speed of graphic cards there should be not too much flickering. Using this method on normal Amigas is nearly impossible.

##### Singeplane

Plotter3D uses a bitplane as buffer. This method is very fast and avoids flickering. On graphic cards (with chunky-mode) it may slow down the drawing.

##### Full

Plotter3D uses a bitmap with the same depth as the screen.

#### Functions

Sets path for functions. Use popup button to use a ASL-filerequester for path selection.

#### Materials

Sets path for materials.

#### Lightsources

Sets path for lightsources.

See also: Cancel/Use/Save

PopUpMenu

---

## 1.25 window\_settings\_imagebuttons

Settings for Imagebuttons

Here you define the Imagebuttons used by Plotter3D. To change the image of an button simply select the entry in the listview and enter a filename into the textgadget. You can also use an ASL-Requester if you press PopUp-Button beside the textgadget. The selected image is shown above the textgadget or in the case of an error a '??'.

You can choose ILBM-brush and ILM-pictures as images. But it should not be too large because MUI may have problems to reopen the Preview window. The standard size is 26x26 pixel.

See also: Cancel/Use/Save  
PopUpMenu

## 1.26 window\_settings\_preview

Settings for Preview

General

Bufferheight

Plotter3D uses a depth buffer and a color buffer to render the pictures (all complex calculations except Monochrom).

The width of these buffers always correspond to the width of the picture. Holding the whole buffer (5\*width\*height bytes) requires a lot of memory. Therefore Plotter3D renders only parts of the picture. You can define the height of one part with the slider. Of course rendering many parts slows down the calculating that's why you should not enter values lower than 50 pixels.

Fast preview

If selected Plotter3D draws only a boundingbox during rotation/moveing a function with the mouse.

Dithermode

Plotter3D calculates always with 24Bit (16.8 million colors). Because this number of colors can only be shown on graphic cards it must be reduced.

With this option you can define the used method.

See also Colorselection of Plotter3D.

Save buffer

The calculated Image can be saved automatical.

Always

Switch saving on/off.

File type

---

Defines the type of the saved file.

Filename

Simply enter the name of the file. You can also use an ASL-Requester with the PopUpbutton.

See also: Cancel/Use/Save  
PopUpMenu

## 1.27 window\_settings\_realtime

Settings for Realtime mode

## 1.28 window\_control

Control-Window

This is the main window of Plotter3D.

Functions

Contains a list of all functions and some buttons. The selected function is shown in the Preview-window. If you click twice on a function the corresponding Edit-window is opened. The list consists of 2 columns: the first shows the name of the function and the second the type.

New

Creates a new function. A Functiontype-window is opened to select the type of the function.

Delete

Deletes the selected function. If these functions is modified a safety-requester is shown.

Load

Opens a ASL-Requester where you can select the function(s) to be loaded.  
See also Plotter3D Savefiles.

Save

Opens a ASL-Requester where you can enter the filename of this function.

Note:

Plotter3D saves all datas in these file  
(function parameter, transformation, material  
and lighting (if exists)).  
See also Plotter3D Savefiles.

Light

Opens a Lighting-Window for the selected function.

---

Material

Opens a Material-Fenster for the selected function.

Quit

Quits Plotter3D. For every modified function a safety-requester is shown.

## 1.29 window\_functiontype

Functionstyp-Fenster

Here you determine the type of an new function.

After you have selected a type the Edit-window is opened.

3D-Function

Creates a 3D-function. You can enter equations for X-, Y-, Z-values with dependencies from parameters U and V.

Cancel

Closes the window without creating a new function.

## 1.30 window\_editfunction

Edit Function

This window consists of two parts. The left one is equal for all functions. The contents of the right one depends on the functiontype. The type is also shown in the windowtitle.

Left part

Name

The name of the function. The name is also shown in the functionlist of Control-window. Therefore it should be short and unique.

Mesh

Contains definition about the internal mesh.

x-Size

The horizontal mesh size. Normaly values between 20 and 100.

y-Size

The vertical mesh size. Normaly values between 20 and 100.

Need-Text

Shows the necessary memory (in bytes) for these function. Depends on the mesh size.

Check

---

Checks all values of these function. A window with the result is shown automatical.

Cancel

Closes the window. All settings remains unchanged.

Ok

Closes the window. The actual settings are used and necessary calculations are made.

A function check is preformed automatical. If an error occurs an error-requestor occurs and the edit window stays open.

Right part

Depends on the function type.

See: Edit 3D-Function

## 1.31 window\_preview

Preview-window

This window is used for general function transformation and drawing a function. All actions change only the function which is selected in the Control-window.

The window consists of four parts. The middle part is the drawing area.

Left part

The description goes from top to bottom. The images of the buttons can be changed with Menu Settings/Imagebuttons.

1. Button

Set mouse handling to rotation.

Means whenever you press the left mousebutton above the drawarea (and hold down the mousebutton) you can rotate the function around X- and Y-axis by moving the mouse. To rotate around Z-axis press right mousebutton.

2. Button

Set mouse handling to movement.

With LMB you control movement along X- and Y-axis.

When pressing RMB you can change the zoom factor.

When the window is large enough same more imagebuttons may appear here. With these you can open Information, Calculation and Realtime window.

3. Button

Opens the Transformation-window.

4. Button

Opens the window for Complex preview.

Drawing area (middle part)

The preview of a function is drawn into this area. The preview

---

type can be choosen with right part buttons.  
If you press left or right mousebutton in this area you can change the transformation. You can select the mouse handling with the left part buttons.

#### Right part

Controls the preview type.

The description goes from top to bottom. The images of the buttons can be changed with Menu Settings/Imagebuttons.

##### 1. Button

Switchs preview off.

##### 2. Button

Set previewtype to simple preview. Only a boundingbox is draw.

##### 3. Knopf

Set previewtype to point preview.

Only the points of the functionmesh and a boundingbox (if selected in menu Settings/Draw Boundingbox) and/or the lightsources (menu Settings/Draw Lightsources).

##### 4. Button

Set previewtype to line-X preview.

Draws lines alongs the X-axis between the points of the functionmesh. If selected also a draws a boundingbox and the lightsources.

##### 5. Button

Sets previewtype to line-Z preview.

Like line-X preview but connects the points along Z-axis.

##### 6. Button

Combines line-X and line-Z preview.

#### Lower part

These sliders enable you to rotate the function with a constant stepsize. With this you get an idea how the function looks.

Normally the buttons stay in the middle of the slider. The further you move them to left/right the faster rotates the function backwards/forwards around an axis. If you release the button it jumps back to zero position (middle).

##### RotX

Rotation around X-Axis

##### RotY

Rotation around Y-Axis

##### RotZ

Rotation around Z-Axis

---

## 1.32 window\_transformation

Transformation-window

Here you control the transformation of the selected function. If you change a parameter a new preview is draw automatical in the Preview-window.

Rotate

rotation angle (degrees) around X-, Y-, Z-axis.

Scale

Scale value of X-, Y-, Z-axis in percent. 100% means no scale.

Move

Movement along X-, Y-, Z-axis.

Special

Settings you don't need very often.

Clipcube

All parts of function that are outside the are cutted.

The cube is then projected into the drawing area.

You can enter the minimal/maximal values of the X-, Y-Z-coordinates. With the +/- Buttons the values can be change in steps of 0.5.

Zoom

Defines the zoom value in percent. 100% means original size.

R

Resets all parameters to internal default values.

## 1.33 window\_complexpreview

Complex Preview

Here you can select previewtypes that can not be drawn in realtime yet. The result is normally shown in Preview-window. (exception: when used with Render-window).

For an description of all previewtypes see Previewtypes.

BubbleHelp is also available: If you place the mouse above the Cyclegadget and don't move the mouse a description of the selected previewtype is shown.

Draw Linemesh

\*\* Not implemented yet \*\*

Draw

Draws the complex preview.

## 1.34 window\_light

### Lighting-window

With this function you can change the lighting of an function. The name of the function is also shown in the windowtitle.

All changes are used immediately. Means you can change some parameter and look at the result in Preview-window. If you made an mistake you can reset to the old settings by pressing 'Cancel'.

This window also consists of 2 parts.

#### Left part

In this area you can modify the list of lightsources.

##### Lightsources

This list contains the names and types of all lightsources. The selected lightsource can be modified with the right part.

##### New

Creates a new lightsource. A window to select the type is opened.

##### Delete

Deletes the selected lightsource \*without\* safety-rquest.

##### Load

Loads new lightsources from a file. A ASL-requester is opened to select the file(s) to be loaded.

##### Save

Saves \*all\* lightsources into a file. If the file already exists a safety-regester is shown.

##### Cancel

Closes the window. The old settings are restored.

##### Ok

Closes the window and the settings are used.

#### Right part

With this part you can change the parameter of the selected lightsource.

##### Name

Defines the name of the lightsource. The name is shown in the lightsource list and when the lightsource is drawn. (Settings/Draw Lightsources).

##### Color

Defines the color of the lightsource. Simply enter the red, green and blue values in percent.

According to the lightsource type this part may contain further elements.

---

#### Parallel Lightsource

##### Direction

Defines the direction (vector) of the lightsource. With the stringgadgets you can enter the X-, Y-, Z-coordinates. With the +/- Buttons the coordinates can be changed in steps of 0.1.

##### Local

If selected, the lightsource is made local. Means that this lightsource is also transformed.

## 1.35 window\_calc

#### Render-window

With this window the selected function is drawn. The name of the function is shown in the windowtitle.

This window can be opened with Menu Window/Render....

#### Rendertype

Here you can select the rendertype.

Description see Complex Preview.

#### Output

Plotter3D has 3 output modes.

#### Output type

Defines the type of output.

#### Don't draw

Switch output off. Because no screen is opened it saves some memory. Of course without switching save on (page Buffer) this mode is senseless.

#### Custom screen

Plotter3D opens an own screen and draws the rendered picture on it.

#### Window on Publicscreen

Opens a window on a public screen. These option should only be used with 16/24Bit CyberGfx-screens.

#### Output settings

Defines the parameter of the output types.

#### Picture

Settings for type 'Don't draw'.

#### Picturewidth

...

```

Pictureheight
...

Custom screen
Settings for type 'Custom screen'.

Screenmode
Defines the screenmode. The textgadget
contains Width x Height x Depth. With
the 'Select...' -Button a Screenmode-
requester is opened.

Public screen
Settings for type 'Window on Publicscreen'.

Screenname
Defines the name of the public screen.

Window width
...

Window height
...

Buffer
On this page you set things like type of color reducing or
if the picture should be saved.
Description see Settings/Preview.

Render
Starts the calculating.

Show Screen/Window
Pops the screen to front. A click on it or into the window
puts the screen of Plotter3D back to front.

Close Screen/Window
Closes the screen or the window.
This is also done automatical if you leave the 'Render'-window.

```

## 1.36 window\_material

### Material-window

In this window you can define the 'Material'-attributes of an function. These attributes are necessary for lighting the function. Therefore they are only used with Flat-, Gouraud- and Phongshading. This is also an interactiv window, means you can change the settings and test them (eq. with Complex preview). Nevertheless you can undo these settings with the 'Cancel'-button.

The sum of values for 'Ambient', 'Diffuse' and 'Specular' should be 1.0.

**Ambient**

Determines the share of ambient light in the color of an pixel. Normally values between 0 and 1. For special cases you can enter other values.

The red, green and blue shares of the lightsources are multiplied with this value.

Affects only ambient lightsources.

**Diffuse**

Like ambient but for diffuse share of the color.

Affects parallel lightsources.

**Specular**

Determines the share of high lights in the color of an pixel.

The color depends \*not\* from a lightsource.

**Spec. Power**

Determines the size of the high lights. Small values results in big enlarged high lights. Big values results in small sharp ones.

**Specular color**

Determines the color of the high light. Simply enter the red, green and blue values in percent.

**Double normals**

Normally a normal is calculated for every area. Because of this a may get ugly results after lighting since areas that are turned away appears black. If you switch on this option two opposite normals area used for every area and both sites of the areas are lighted equal.

**Load**

Loads a new material definition.

**Save**

Saves the material definition.

**Cancel**

Closes the window. The old settings are used.

**Ok**

Closes the window. The new settings are used.

## 1.37 window\_realtime

**Realtime-window**

This window can be opened with Menu Window/Realtime....

Plotter3D has an special realtime mode. With this its possible to view the function in realtime! The function can be rotated, moved and scaled.

\*\*\*\*\*

---

```

** These mode needs at least a processor of type 68020 and a      **
** graphic hardware that can display 256 colors (an AGA-chip or **
** an CyberGfx-system)                                          **
*****

```

#### Control

All supported keys are shown here.

#### Screenmode

Press the 'Select'-button to select the screenmode.

Note: Values bigger than 320x256 should only be used  
with a fast computer (68030) and a graphic card.

#### Show angles

The rotation values are shown if you switch this option on.

#### Go!

Have fun.

#### Informations

How already described above you need at least an 68020 because special commands of this precessor are used. But for real fun you need a fast 68030. On my computer (50Mhz 68030) and an functionmesh with the size of 20x20 (==800 areas) it runs in 12 pictures/s.  
Also FAST-Ram helps a lot (0.5 - 1 Mbyte).

If you own a graphic card you should choose an screenmode that runs on this card. This increases graphic speed and reduces necessary processor power. The picture datas must be converterd on AGA-computers which costs about 33% of the processor power. Besides you should select always a LORES-screenmode beacuse otherwise additional speed losts occur. And the resolution is limited to a maximum of 512x512.

The drawing can becaome faster if the backfaces are removed automatical (Shift h). This works very good for example with the "Torus"-function. In most cases this mode results in wrong (incomplete) pictures. In some cases these effects can be avoided by using option "inverse depthsorting" (i, Shift i).

The used palettes are loaded from 'Plotter3D:Palettes'. Press key "c" to toggle to next palette. You can add own palettes with external program ConvertPalette.

By pressing left or right mousebutton you switch to mouse control mode. Now you can rotate the function around X- and Y-axis (LMB) and Z-axis (RMB). To switch back to normal mode press 'p'.

## 1.38 window\_clipboard

### D&D Clipboard

This window can be opened with menu Window/D&D Clipboard....  
Simply drag formulas, names and numbers into the list. In the same way you can drag entries from the list and drop them over stringgadgets. But remember that its not possible to use a floatingpoint number as formula. The contents also remains the closing of the window.  
More informations for Drag&Drop can be found within the MUI-documentation.

Remove

Removes the selected entry.

Clear

Removes all entries.

## 1.39 window\_informations

Informations

This window can be opened with Menu Window/Informations....

Here you can find special informations for the current function.

Boundingbox

Displays the maximum and minimum X-,Y-,Z-values.

## 1.40 group\_edit3dfunction

Edit 3D-function

Belongs to the Edit-window.

Function

Formulas to calculate the X-, Y- and Z-values. They may only depend on variables u and v otherwise you get an errormessage during functioncheck.

The 'Add'-button besides the stringgadget opens a window that contains all implemented operators/functions. Simply do an doubleclick on an entry to insert it at the current cursor position.

See also Formula description for further informations on formulas.

Factor

Defines the scale values for X-, Y- and Z-values. With the +/- buttons you can change the values in steps of 1.

See also Function creation for further informations on scale values.

Parameter u

Settings for variable u. During calculation this variable is set to all values from 'from' to 'to'. The values can be changed with the +/- buttons in steps of 0.5.

---

Parameter v

Like parameter u but for the second variable v.

See also: [Function creation](#)

[Formula description](#)

## 1.41 node\_functioncreating

Function creating

Notes about function creation:

Plotter3D calculates for every function the minimal and maximal X-, Y- and Z-coordinates. The internal scale value is calculated in the following way:

- choose the axis with the largest extension  
(maximum-minimum)
- the scale value is 200 divided by this extension

This simply means that every function has a maximum extension of 200 units.

Because this is done *after* calculating you won't get more details. If you use fixpoint-arithmetic you may also get unusable results.

The way is to set the scale values for every axis to an appropriate value because they are used *during* calculating.

Example 1:

```
Parameter U: from -3.14 to 3.14
Parameter V: from -3.14 to 3.14
Function-X : u
Function-Y : sin(u^2)*cos(v^2)
Function-Z : v
```

The X- and Z-values should have an ideal extension from -100 to 100 ( $100 - (-100) = 200$ ). Therefore set X- and Z-factor to 23 ( $100/3.14$ ).

The Y-values reach from -1 to 1. To see anything useful you should set the Y-factor to 20 (or similar).

Example 2:

```
Parameter U: from -3.1459 to 3.1459
Parameter V: from 0.0 to 3.1459
Function-X : sin(u)*cos(v)
Function-Y : cos(u)
Function-Z : sin(u)*sin(v)
```

If you take a closer look you see that the X-, Y- and Z-values reach from -1 to 1. Set all factors to 100 and you get an perfect sphere.

## 1.42 node\_formula

## Allowed formulas

A formula consists of any number of numbers, variables, operators, functions and brackets.

Numbers : eq. 2, 1.0, -3.1459

Variables : u,v

Brackets : (, )

Operators : (order like their priorities)

^ x to the yth power

\* multiplication

/ division

% remainder of integer division

\ integer division

+ addition

- subtraction

Functions : only functions with one argument

the argument must be surrounded by brackets (eq.  $\sin(u^3)$ )

for implmented functions see 'Add'-buttons of the edit-window.

correct formulas are (for example):

u

$u - u^3/3 + u \cdot v^2$

$(15 + 6 \cdot \cos(u)) \cdot \sin(v)$

$(1 + \cos(20 \cdot (u^2 + v^2)^{0.5})) / (13 \cdot (u^2 + v^2) + 0.5)$

## 1.43 node\_previewtypes

### Previewtypes

Plotter3D has the following previewtypes:

#### Hiddenline

Draws the borders of all areas. Hidden parts are overwritten.

With this mode you may get errors if big/long areas are drawn.

#### Random color

All areas are filled with a random color.

#### XYZ-colorflow

Every point of the mesh gets a special color. The color is calculated from the coordinates of this point. The red share is proportional to the value of the X-coordinate. For the green respectivly blue share the Y respectivly Z-coordinate is used. Note: the orignal coordinates are used which means that the colors are also rotated, scaled, moved.

While drawing the colors are spread which results in a smooth colorflow.

#### Heightsteps

Every point the mesh gets also a special color that is spread on the area.

The color depends only on the Y-coordinate. It results in a

rainbow-effect. Note: again the original coordinates are used.

#### Flatshading

This mode needs a lighting.

For every area a color that depends on lighting and material is calculated. Then the area is filled with this color.

Note:

If the valid colorrange (0..1) is exceeded Plotter3D scales down *\*all\** colorvalues until they are all inside the valid range. Of course the picture loses some intensity but the colors are preserved.

#### Gouraudshading

The colorvalues are calculated for every point of the mesh and then spread on the areas.

The rest is the same as with Flatshading.

#### Phongshading

\*\*\* Warning, this mode needs much calculation time \*\*\*

The special thing with Phongshading is that the lighting is calculated for every picture *\*during\** rendering. This slows down calculating speed very much but increases quality of the pictures.

Note:

Because its not possible to put the colorvalues in an valid range, larger values are truncated.  
Of course this may result in wrong colors.

#### Colortest

This is a testmode for the colorsystem. It creates a colorflow from blue, red, yellow and green.

## 1.44 node\_boundingBox

### BoundingBox

Plotter3D calculates for every function the minimal/maximal X-, Y-, Z-values. The boundingbox is then a cube with these corners.

Hidden edges are drawn ghosted. Also origin and axis are marked.

## 1.45 node\_lightsources

### Lightsources

Plotter3D supports the following lightsources:

#### Ambient light

You should only define one ambient lightsource. Ambient light is the diffus reflected part of light and lights *\*all\** areas with the same intensity. You can change the general brightness and color of the picture.

#### Parallel light

This light is like sunlight. Because of the large distance the rays are nearly parallel. Depending on the angle of incidence the intensity spreads on a more or less large area. This also causes highlights.

#### Point light

\* not implemented yet \*

#### Spot light

\* not implemented yet \*

## 1.46 node\_colorcontrol

### Colorselection

Plotter3D calculates most datas in 24Bit (16.8 million colors). The most graphic cards features special 15/16/24Bit-modes which are supported by CyberGfx. On such a screen Plotter3D can display the datas directly. Normally there are less free colors. To display the pictures the number of colors must be reduced. The main goal was high speed because Plotter3D displays only a preview. The get high quality results save the 24Bit data use specialized programs like SuperView or AdPro for color reducing.

Plotter3D has 2 different modes:

#### Grayscale-Matrix

In this mode the datas are first merged to 8Bit (256 greyscales) and then reduced to the number of free colors.

#### RGB-Matrix

Now the colors are reduced directly to the available color number. This mode needs at least 32 free colors otherwise it switchs back to grayscale mode.

Because of the internal construction Plotter3D can only use a fixed palette. Means also if the picture has only bluetones the palette also contains red and green colors.

### Internal

The color managment and the representation is independent from rendering. Plotter3D has 3 specialized "drivers" for this. The currently used driver and his datas are shown in the System-window (Menu Project/About...).

#### CyberGfx

This driver is used with 15/16/24Bit Cybergfx-screens. Beacuse the 24Bit-datas are given directly to CyberGfx-system it is very fast.

#### Kick v39+

This driver is used if you have installed Kickstart 3.0 (or above) and use a screen with <=256 colors. The driver tries to obtain as much free colors as possible.

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Kick v36+

This driver is selected if no other driver can be used.  
Beacuse its not possible to obtain colors no preview can be  
drawn on a public screen. On custom screens (like the one  
used with Rendering) all colors are used.

## 1.47 node\_savefiles

SaveFiles

Plotter3D uses the IFF-fileformat for all files (except picturetypes like Targa). This has the advantage that a file must not contain all informations or may contain additional ones. If some informations are missed they are replaced by internal defaults. For example a function-file may have no lightsources.

On the other hand its possible to load a function-file as material definition. Plotter3D simply searchs the material datas within the file and use them.

The program 'Analyse\_Savefile' (in Plotter3D:Tools/) shows all informations ("Chunks") of file that was created by Plotter3D. This makes it easy to check what Plotter3D writes into a file.