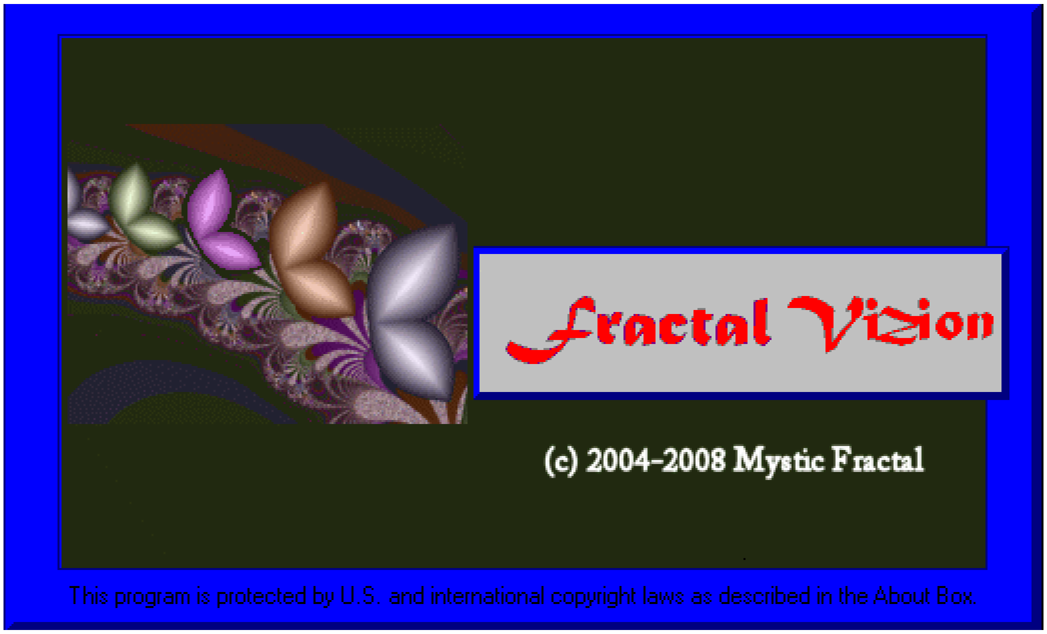

Fractal ViZion Application Help

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1.1 Title Bar

Title Bar

The title bar is located along the top of a window. It contains the name of the application and drawing.

To move the window, drag the title bar. Note: You can also move dialog boxes by dragging their title bars.

A title bar may contain the following elements:

- Application Control-menu button
- Drawing Control-menu button
- Maximize button
- Minimize button
- Name of the application
- Name of the drawing
- Restore button

1.2 Scroll bars

Scroll bars

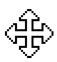
Displayed at the right and bottom edges of the drawing window. The scroll boxes inside the scroll bars indicate your vertical and horizontal location in the drawing. You can use the mouse to scroll to other parts of the drawing.

<< Describe the actions of the various parts of the scrollbar, according to how they behave in your application. >>

1.3 Size

Size command (System menu)

Use this command to display a four-headed arrow so you can size the active window with the arrow keys.



After the pointer changes to the four-headed arrow:

1. Press one of the DIRECTION keys (left, right, up, or down arrow key) to move the pointer to the border you want to move.
2. Press a DIRECTION key to move the border.
3. Press ENTER when the window is the size you want.

Note: This command is unavailable if you maximize the window.

Shortcut

Mouse: Drag the size bars at the corners or edges of the window.

1.4 Move

Move command (Control menu)

Use this command to display a four-headed arrow so you can move the active window or dialog box with the arrow keys.

Note: This command is unavailable if you maximize the window.

Shortcut

Keys: CTRL+F7

1.5 Minimize Command

Minimize command (application Control menu)

Use this command to reduce the Fractal ViZion window to an icon.

Shortcut

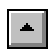
Mouse: Click the minimize icon  on the title bar.
Keys: ALT+F9

1.6 Maximize Command

Maximize command (System menu)

Use this command to enlarge the active window to fill the available space.

Shortcut

Mouse: Click the maximize icon  on the title bar; or double-click the title bar.
Keys: CTRL+F10 enlarges a drawing window.

1.7 Next Window

Next Window command (drawing Control menu)

Use this command to switch to the next open drawing window. Fractal ViZion determines which window is next according to the order in which you opened the windows.

Shortcut
Keys: CTRL+F6

1.8 Previous Window

Previous Window command (drawing Control menu)

Use this command to switch to the previous open drawing window. Fractal ViZion determines which window is previous according to the order in which you opened the windows.

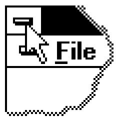
Shortcut
Keys: SHIFT+CTRL+F6

1.9 Close

Close command (Control menus)

Use this command to close the active window or dialog box.

Double-clicking a Control-menu box is the same as choosing the Close command.



Shortcuts

Keys: CTRL+F4 closes a drawing window
ALT+F4 closes the application

1.10 Restore

Restore command (Control menu)

Use this command to return the active window to its size and position before you chose the Maximize or Minimize command.

1.11 Switch to

Switch to command (application Control menu)

Use this command to display a list of all open applications. Use this "Task List" to switch to or close an application on the list.

Shortcut

Keys: CTRL+ESC

Dialog Box Options
When you choose the Switch To command, you will be presented with a dialog box with the following options:

Task List
Select the application you want to switch to or close.

Switch To
Makes the selected application active.

End Task
Closes the selected application.

Cancel
Closes the Task List box.

Cascade
Arranges open applications so they overlap and you can see each title bar. This option does not affect applications reduced to icons.

Tile

Arranges open applications into windows that do not overlap. This option does not affect applications reduced to icons.

Arrange Icons

Arranges the icons of all minimized applications across the bottom of the screen.

2 Fractal ViZion Remote

Fractal ViZion Remote

The remote provides access to many of the most-used commands in Fractal ViZion. Info about each button can be obtained by using the '?' box located near the close box in the top right-hand corner.

2.1 Channel Guide

Channel Guide

The twelve channels accessed via the FV remote:

J1: Random Julia -- basic Julia sets, using one formula and many different rendering options

J2: Random Julia 2 -- includes more advanced composite-type fractals, using two formulas and Escher-type fractals

Q1: Random Quaternion/Hypernion -- traditional 3D quaternion and hypercomplex quaternion fractals

Q2: Random Quaternion/Hypernion 2 -- extended search through non-traditional formulas

HF: Random Julia height fields -- 3D rendering of Julia sets using ray-tracing and continuous potential smoothing

LD: Random Landscapes -- 3D rendering using ray-traced mid-point displacement algorithm

LS: Random Lsystems -- 3D turtle graphics with ray-traced highlights

OR: Random Orbital fractals -- 3D rendering of strange attractors

ST: Random Bubbles and Stalks -- based on Paul Carlson's bubble and stalk methods, with extensions to Newton sets

NT: Random Newton/Halley -- Julia sets using Newton's method and Halley's methods, with various convergent techniques and other rendering options

HY: Random Hypercomplex -- Julia sets using hypercomplex extensions

IF: Random IFS -- IFS slide show using techniques developed by Michael Barnsley

2.2 New

New button

Use this button to create a new drawing window in Fractal ViZion. A random set of data is used to create the new window.

2.3 Undo

Undo button

Use this command to undo the last action. An image can be continued after an undo, if continue was enabled before the last action, but not after an image is resized. Color-cycling is disabled after using Undo.

2.4 Size

Size button

This allows you to set the drawing area for a picture, independent of the Windows screen size. It also shows which size is currently in use. The aspect for the drawing is based on the ratio of X (horizontal width) to Y (vertical height.) The custom setting allows for any size/aspect that system memory will permit. Videos are limited to the standard 4/3 vga aspect or 1/1. The minimum size for an image is 40X30.

2.5 Color

Color button

Use the palette editor to modify the palette(s) in use.

2.5.1 Edit Palette

Edit Palettes

It is important to realize that palettes are software-simulated in Fractal Vision (since 24-bit color supports no hardware palettes), so color-cycling and palette switching are not fast operations as with a 256-color system that supports palettes.

There are copy and spread options to smooth or customize the existing palettes in Fractal ViZion. You can then save all the palettes in a .pl file, or by saving the entire function and bitmap (FV saves all the palettes in the data file.)

Colors are shown in 8 groups of 32 colors. This makes it easy to create divide-by-8, divide-by-4 and divide-by-2 palettes with 256 colors. With Fractal ViZion, a palette is actually 65281 colors, with each succeeding color (except the last) followed by 255 colors that are evenly spread from one color to the next.

Use the RGB-slider controls to edit any color in the palette. Select Copy to copy any color to another spot in the palette. Select Spread to define a smooth spread of colors from the current spot to another spot in the palette. Copy and Spread take effect immediately when you select another spot with the mouse button. You can cancel the operation with the Cancel button. In Fractal ViZion, colors do not cycle smoothly when you adjust the RGB/HSV sliders. This would be too slow with true color. The Map button is used to map color changes to an image after you are done adjusting the sliders. In the HSV mode, color spreads are based on HSV values instead of RGB values, which in some cases results in brighter color spreads.

Right-click on any point on the main window and the palette color for that pixel will be displayed in the palette editor. You can use any of the color-cycling keys (after clicking on the main window) to see the effects of the cycling in the palette editor window. Note: color cycling and color-selection-from-pixel only works when the image has been drawn in the current session. If you load a pre-existing image file, you must redraw it to cycle colors, etc. Anti-aliasing, 3D height fields, undoing an action and hsv filtering also disable color cycling.

Use Reset to reset the colors of the palette in use, to where it was before it was cycled or modified. Note: if you change palettes with one of the function keys, any modifications to a previous palette are unaffected by the Reset button.

Use Reverse to reverse the order of the colors in the palette. This affects only those colors in the start-color to end-color range. Useful for reversing divide-by-eight palettes, etc., for orbit-trap pictures that require a reversed palette.

Use Neg to create a palette that is the complement of the current palette.

Use Rand to create a random palette. The palette created varies to match the fractal type and color option selected in the Fine-Tuning menu.

Use SRG to switch the red and green components of all palette colors.
Use SRB to switch the red and blue components of all palette colors. SRB and SRG are disabled in HSV mode. You can use these buttons to form eight different palettes by repeatedly switching red, green and blue components.

Note: unless you click on Reset before exiting the editor, changes are permanent to the palette edited, no matter which way you close the editor (Okay button or close box.) Changes are also permanent when the palette is cycled via the up/down arrow keys.

2.5.2 Reverse button

Reverse button

Use Reverse to reverse the order of the colors in the palette. This affects only those colors in the start-color to end-color range. Useful for reversing divide-by-eight palettes, etc., for orbit-trap pictures that require a reversed palette.

2.5.3 Neg Button

Neg button
Use Neg to create a palette that is the complement of the current palette.

2.5.4 Map Button

Map button
In Fractal ViZion, colors do not cycle smoothly when you adjust the RGB/ HSV sliders. This would be too slow with true color. The Map button is used to map color changes to an image after you are done adjusting the sliders.

2.5.5 H/R Button

H/R button
Change from HSV to RGB mode or back. In the HSV mode, color spreads are based on HSV values instead of RGB values, which in some cases results in brighter color spreads.

2.5.6 Spread Button

Spread button
Select Spread to define a smooth spread of colors from the current spot to another spot in the palette.

2.5.7 Copy Button

Copy button
Select Copy to copy any color to another spot in the palette.

2.5.8 SRB Button

SRB button
Use SRG to switch the red and blue components of all palette colors. RGB mode only.

2.5.9 SRG Button

SRG button
Use SRG to switch the red and green components of all palette colors. RGB mode only.

2.5.10 Okay Button

Okay button
Click on Okay to exit the palette editor, applying unmapped color changes to picture (if color-cycling is enabled.)

2.5.11 Reset Button

Reset button
Use Reset to reset the colors of the palette in use, to where it was before it was cycled or modified. Note: if you change palettes with one of the function keys, any modifications to a previous palette are unaffected by the Reset button.

2.5.12 Cancel Button

Cancel button
You can cancel a copy or spread operation with the Cancel button.

2.5.13 Red Slider

Red slider
Use the RGB/HSV-slider controls to edit any color in the palette.

2.5.13.1 Red edit box

Red edit box
Shows red/hue value of selected color index.

2.5.14 Green Slider

Green slider
Use the RGB/HSV-slider controls to edit any color in the palette.

2.5.14.1 Green edit box

Green edit box
Shows green/saturation value of selected color index.

2.5.15 Blue Slider

Blue slider
Use the RGB/HSV-slider controls to edit any color in the palette.

2.5.15.1 Blue edit box

Blue edit box
Shows blue/value magnitude of selected color index.

2.5.16 Rand Button

Rand button
Use Rand to create a random palette. Fast way to define palettes after loading LParser files.

2.6 Batch

Batch button
Here you set parameters for batching and saving random-generated images to disk.

2.6.1 Batch mode

Batch mode
When the Repetitions value is non-zero, up to 1000 random images can be generated and saved to disk (when you next click on a channel button.) Use a unique Filename to prevent batch files from overwriting existing image files. The Scan Limit directs the program on how many scans it makes through each formula before it skips to a new formula (if an interesting Julia fractal hasn't been found.) For lsystems, the scan limit is a limit on how many mutations on the rules may be done before drawing.

For quaternions you have the option of selecting only quaternion types, only hypernion types (hypercomplex) or a mixture of quaternion/hypernion types. For lsystems, you can set the mutation mode to Fixed, to allow a limited number of mutation factors. This results in an lsystem that remains the same number of lines as the original (unmutated) lsystem. The base lsystem can be chosen at random, or only the current lsystem is mutated over and over. Each random lsystem starts with the base lsystem, to keep some consistency in the mutated image. You can also control the size of the lsystem (small mutations can create very large lsystems, which can bog down the batch mode) by setting the Max Lines variable to a smaller value (default is 25000.) A good value to use is 5000. Up to 5000 lines of the lsystem will be drawn before moving on to the next lsystem in the batch. Note: the max lines variable isn't saved with the image's data file, so the image can be recreated with any suitable lines limit, when not in batch mode. Many lsystems don't exceed 5000 lines.

2.7 Fvr

FVR button

The window varies with the channel selected, and contains all the major variables that Fractal ViZion now scales between key frames of an avi stream.

2.7.1 FVR Variables (Julia)

FVR Variables (Julia)

There are edit controls for entering the complex constant (real and imaginary parts), for animation purposes. Slider-type controls affect the number of iterations (more iterations sometimes increases detail, but can lengthen drawing time also), the z-limit (the bailout value.) Cj, ck, hj and hk are for entering hypercomplex parameters.

There is now a formula scroll box that lists available Julia formulas. You can change the current formula by clicking on one of the listed formulas, then the Okay button.

Edit boxes are provided for animating/changing certain rendering features that may or may not be enabled in the current fractal. These include the Epsilon variables (orbit-trap rendering), Qfactor (level-set rendering and continuous potential), Decomp. Angle (continuous decomposition), Bubble limit (bubble fractals), and Escher degree (Escher fractals.) For level-set rendering, the qfactor can vary from 0-200, while its range for continuous potential is 0-65536. Suggested ranges for the other variables appear beside their edit boxes.

The Slope/Cutoff box acts as a palette multiplier or divider, depending on whether the value entered is less than or greater than 1.0. The palette color is divided by the Cutoff to speed up or slow down color changes. Cutoff values are limited to a low minimum of .001. Bubble and orbit-trap pictures (epsilon is enabled) use a negative cutoff value to maintain a smooth palette. This ensures that the multiplier is used before the (floating-point) palette values are converted to (integer) palette indexes. For bubble pictures that use a split-palette, the cutoff value should equal -(bubble limit)*split value (2,4,8).

Select the Okay button to redraw the current Julia set after changes have been made to variables.

The Reset button returns all edit boxes to their original values when the window was opened.

Select Cancel to exit this window without applying changes.

2.7.2 FVR Variables (3D Julia Field)

FVR Variables (3D Julia Field)

There are edit controls for entering the complex constant (real and imaginary parts). Slider-type controls affect the number of iterations (more iterations increase detail but may make the height field coarser looking), the z-limit (bailout value). Cj, ck, hj and hk are for entering hypercomplex parameters.

There is now a formula scroll box that lists available Julia formulas. You can change the current formula by clicking on one of the listed formulas, then the Okay button. Note: some formulas don't work very well with height fields.

The Height variable controls the amount of depth for each point plotted. Use less for smaller plots. The amount of height used depends on the smoothing factor, size of plot and iterations. Excess height can result in a plot being clipped off the screen. The plot is drawn left to right, so that the lower edge of the plot can be set with the Baseline box. Potential is mapped with continuous color changes from the bottom of the plot to the starting line. The baseline should be adjusted so that the starting line is nearly invisible, with as smallest a section shown as possible, to minimize odd color changes at the start of the plot. For some views, it is impossible to avoid a clipped-polygon effect if the potential are high at the start of the function's min/max zones.

The Baseline value controls centering of the plot up and down. The plot is automatically centered left to right. A positive value moves the plot down on the screen. This value may require adjustment when changing the size of the plot or with increases in height. The slope factor is used to determine how steep points near the upper limit of escape times appear on screen. Continuous potential plots usually use a smoothing value of 2.0. The Height factor can be varied to produce steeper/flatter fields.

The Set Height box is used to specify a height for the set potential. Normally the set is mapped at the highest potential (# of colors-1), but this can vary for special effects or animation purposes. Using a Set value of less than 0 automatically maps the set potential at the highest potential. The Set value also sets the color index for the Mandelbrot lake.

Select the Okay button to redraw the current Julia field after changes have been made to variables.

The Reset button returns all edit boxes to their original values when the window was opened.

Select Cancel to exit this window without applying changes.

2.7.3 FVR Variables (Quaternion)

FVR Variables (Quaternion)

There are edit controls for modifying the complex constant (real and imaginary parts), for animation purposes. Slider-type controls affect the number of iterations (increasing iterations increases detail but results in a coarser looking quaternion), the z-limit (affects depth mapping of the quaternion -- increase if parts of the quaternion figure look flattened). Cj, ck, hj and hk are for entering hypercomplex parameters. Hj is usually 2.0, but may need increasing if flat areas appear in the figure. The other hypercomplex variables can be varied to explore alternate dimensions of the 4D figure (what appears is actually a 3D slice).
Three rotate variables determine the viewing angle of the figure, while the light variable (lightx thru lightz) determines the direction of the light source used in the ray-tracing algorithm.

There is now a formula scroll box that lists available formulas for generating quaternions. You can change the current formula by clicking on one of the listed formulas, then the Okay button. There are also scroll boxes to change the user-defined functions for certain formulas. Note: not all of the formulas and functions listed produce "quaternions"; some don't appear to do anything (Newton formulas, for example). Some formulas work in only narrowly defined fractal space, so it's best to experiment with these freely.

Hypercomplex math tends to generate rectangular structures, while quaternion math generates smoother circular objects. So using quaternion math where possible produces more esthetically pleasing results with many of the built-in formulas.

Select the Okay button to redraw the current quaternion after changes have been made to variable.

The Reset button returns all edit boxes to their original values when the window was opened.

Select Cancel to exit this window without applying changes to the quaternion.

2.7.4 FVR Variables (Orbital)

FVR Variables (Orbital)

Initial iterations are set at 1 million for a quick preview, but most plots require more iterations to completely fill in the orbital figure. Increasing the size of the plot also requires increasing the iterations by the same factor.

There is now a formula scroll box that lists available orbital formulas. You can change the current orbital formula by clicking on one of the listed formulas, then the Okay button.

Three rotate variables determine the viewing angle of the figure, while the light variable (lightx thru lightz) determines the direction of the light source used in the ray-tracing algorithm.

Select the Okay button to redraw the current orbital fractal after changes have been made to variables.

The Reset button returns all edit boxes to their original values when the window was opened.

Select Cancel to exit this window without applying changes.

2.7.5 FVR Variables (Lsystem)

FVR Variables (Lsystem)

For animation purposes, etc., there are edit boxes to set projection angles, roll pitch and yaw. The angles have a range of -360 to 360 degrees. The initial turtle heading is 0,1,0 -- which moves the turtle up in the direction of the y-axis when the projection angles are all 0. The view may be improved when some of the projection angles are non-zero, or to rotate an object to an appropriate viewing angle.

There is now a Sample scroll box that lists available lsystems in the startup directory. You can change the current lsystem by clicking on one of the listed lsystems and then the Use Sample button.

The skewing angles affect the line styles when the line width is greater than 1. These can warp the lines (tubular or poly) to a non-uniform width.

You enter the level of recursion into the level box. The maximum level of recursion is limited to 50.

Use the scale slider to set the size of the drawing, .05 to 1.0. Each lsystem is pre-scaled prior to drawing, to approximate the size of the draw window. To speed up the pre-scaling, the width of the line drawn isn't used to map image limits. So it's possible an object may extend off the window's edges, when a line width is greater than 1 and the scale is 1. In this case, use a scale less than 1 to "shrink fit" the drawing.

Click on Draw to recompute and draw the current axiom.

Select Wire Frame to draw a wire frame model of the current axiom/rules. This is useful to speed up drawing while prototyping an lsystem.

Enter additional Steps (default 1), to increase the resolution of solid rendering. Each additional step increases rendering time proportionally, but can increase the smoothness of certain area fills, as in polygon rendering of large objects.

Enter a non-zero mutation value to mutate the current lsystem. This follows the same mutation rules as LParser. Small values (less than 5) can produce extremely lengthy mutations. Use Fixed Mutation to limit the size of the mutated lsystem to the original size. In this case the no rules are appended or inserted. Only angle and movement commands are switched.

Select the extended set box to enable the extended rule set. Most input files made for LParser will work with the extended set enabled, but the extended rules may not work if the command is overridden by a production rule. Note: for further info on the extended syntax, please read the help file supplied for my program Fractal Zplot.

2.7.6 FVR Variables (Landscape)

FVR Variables (Landscape)

The Baseline variables controls centering of the plot up and down. The plot is automatically centered left to right. A positive value moves the plot down on the screen. This value may change with the size of the plot or with increases in height. The Height factor can be varied to produce steeper/flatter terrain.

The Order box is used to control the fractal dimension (valid inputs are 0-1.0). A lower number gives the fractal a higher dimension, and thus more ragged and choppy appearance. The Pts box is used to control shaping and fullness of the finished plot. The plot may include random additions at every point or just the end points. The shape may be scaled linearly or non-linearly. The following values for the pts box control random additions and shape:

0 -- random additions at end points only; linear shaping.
1 -- random additions at every point; linear shaping.
2 -- random additions at end points only; non-linear shaping.
3 -- random additions at every point; non-linear shaping.

A higher Height value (ten times or more) is usually required for types 2 and 3 shaping to develop landscape depth.

Two variables, Wave Turbulence and Wave Displacement affect water characteristics in the landscape. A turbulence factor of 0.0 produces completely smooth water. Increase to simulate wave rhythms in the water (.9 is the default value, but lower values may be desired for smoother rhythms.) The displacement value moves the wave rhythms diagonally a step with each unit value, for animation purposes. This gives some apparent movement to the rhythms, though not exactly a real simulation of ocean tides (all water areas are displaced.) Note: for coloring purposes, color index 255 is used for water in landscape pictures. Color index 254 is used to color areas that are above the water line when the baseline is first drawn.

Select the Okay button to redraw the current landscape after changes have been made to variables.

The Reset button returns all edit boxes to their original values when the window was opened.

Select Cancel to exit this window without applying changes.

2.8 Draw button

Draw button

Use this button to draw or redraw the image for the current fractal variables. Clicking inside the draw window with the left-mouse button stops all plotting. Use the Cont button to restart plotting from the current column. When the lsystem option is selected, a custom is opened to enter lsystem draw options.

2.9 Abort button

Abort button

Use this command to stop drawing. Clicking inside a window's drawing area or close box (or the program close box) will also stop the drawing. Note: once a plot has started Fractal ViZion continues to draw the image for that window regardless of which drawing window has the input focus, until done or aborted. You can open and close other drawing windows without affecting the current drawing, but only one drawing is active at any time.

2.10 Cont

Continue button

Continues a plot that was aborted early. The plot is restarted at the beginning of the last row drawn.

2.11 Scan

Scan button

This generates a Julia set from a formula's Mandelbrot 'P' space. Random points in a formula's current Mandelbrot space are scanned for an interesting Julia set. Rendering options are maintained in the current fractal. Equivalent to the 'F' hot key. Not used with lsystem, landscape or orbital fractals.

2.12 Rend

Rend button

The rendering options for the current fractal are randomized. Does not affect formula or range(zoom) variables. For quaternion, landscape, orbital and 3D height fields, a random coloring filter is applied.

2.13 View

View button

Displays the entire plot, expanding or shrinking the image to fit in a maximized window without title bar, scroll bars or menu bar. At all other times, part of the picture is hidden by the inclusion of the title bar, toolbar, scroll bars and menu bar. To exit full-screen mode, press any key or click the left-mouse button.

2.14 Light

Light button
Edit lightpoint and viewpoint variables

2.14.1 Ray-Tracing Window

Ray-Tracing Window
The Light Point variables (lightx thru lightz) determine the direction of the light source used in the ray-tracing algorithm. The ViewPoint represents the angle, at which the object is ray-traced, which can affect Phong highlights greatly. This has no effect on the camera view.

The Lighting variables shininess, highlight, gamma and ambient are used to adjust ambient light and highlights. The ranges for these variables appear beside their label. Decreasing the shininess value increases light reflected by the 3-D figure and the apparent sheen on the figure's surface. The ambient value controls the amount of ambient light that illuminates the figure. The highlight value increases or decreases the specular (Phong) highlighting, while the gamma value increases or decreases the intensity of the light source's illumination. Once a plot is started, the lighting variables and light point can be changed without redrawing the 3-D figure.

Click the Apply button to redisplay a plot after changing the lighting variables or light point. Click the Okay button to close the Ray-Tracing Window, applying new settings, if the variables were modified. Click on Cancel to revert to the state that existed when the ray-tracing window was opened. Click on Defaults to set the lighting and viewpoint variables to the built-in defaults for these variables.

2.15 Info

Info button
Use this button to get info on the current formulas/fractal types in use.

2.15.1 Lsystem info

Lsystem info
Fractal ViZion contains an extended version of the 0L-system (string rewriting) described in The Science of Fractal Images (edited by Pietgen and Saupe.) The basic algorithm has been expanded and modified extensively, and now supports the 3-D syntax of Laurens Lapre's LParser.

A number of .ls files have been included in the FV distribution package that are used for random lsystem generation. These are listed below.

Ls-files based on 'The Algorithmic Beauty of Plants' :
----

bop00.ls	cordate leave	ABOP page 123
bop01.ls	plant	ABOP page 27
bop02.ls	bush	ABOP page 26

bop03.ls	form in 2d	ABOP page 25
bop04.ls	block form	ABOP page 20
bop05.ls	fractal	ABOP page 9
bop06.ls	dragon curves	ABOP page 9
bop07.ls	compound leave	ABOP page 130
bop08.ls	compound leave in 3d	ABOP page 129
bop09.ls	maple like leave	ABOP page 129
bop10.ls	nested polygon leaves	ABOP page 127
bop13.ls	lychnis structure	ABOP pagee 84
tree00.ls	monopodial tree	ABOP page 56
tree01.ls	monopodial tree	ABOP page 56
tree02.ls	ternary tree	ABOP page 60

Free form experiments and other fractals :
----

lsys00.ls	lobster form
lsys01.ls	" var 1
lsys02.ls	" var 2
lsys03.ls	" var 3
lsys04.ls	" var 4
lsys05.ls	spiral bush
lsys06.ls	tree base
lsys07.ls	half circle
lsys08.ls	" var 1
lsys09.ls	cello plant
lsys10.ls	circle form
spiral00.ls	overview of spiral types
spiral01.ls	spiral form
spiral02.ls	spiral tree
spiral03.ls	large spiral plant var 1
spiral04.ls	large spiral plant var 2
tree03.ls	willow type tree
tree04.ls	conifer type tree
tree05.ls	'best' tree
tree06.ls	conifer type tree
tree07.ls	tropism experiment
tree08.ls	'palm' tree based on bop07.ls structure
tree09.ls	'Trail off trees' showing the different growth stages
tree10.ls	leavy ternary tree type
tree11.ls	elaboration on tree08
tree12.ls	'Trail off trees' of tree10
street1.ls	a series of trees

flower.ls	cordate leave arrangement
fern.ls	fern plant
leaves.ls	variation on bop00.ls
fract*.ls	L-systems from FractInt
shell*.ls	shell type forms based on spirals and bop10.ls
airhorse.ls	part seahorse but with external lung
spider.ls	octo-spider
menger.ls	a menger cube

Ls-files by Cees van der Mark

----

plant*.ls	plants by Cees
passie.ls	a passion flower plant
hangpl*.ls	crystal with leaves
crystal*.ls	crystals
bekerpl.ls	plant/kwal
pascal*.ls	pascal cube
sier*.ls	sierpinski gasket
koch*.ls	koch variation
3dartist.ls	3dartist logo

Ls-files by Martin Higgs

----

s_plus.ls	sierpinski variants by M. Higgs
higgs01.ls	produces a crustacean of the subclass Copepoda
higgs02.ls	produces a crustacean of the subclass Copepoda, Mutated relative
lobster.ls	another beast
butter.ls	butterfly

Ls-files found on the net

----

bac1.ls	produces a daysa rigidula
bac2.ls	produces a dasysiphonia rigidula
bac3.ls	spiral design

Note: LParser files may be added or subtracted from the default lsystem directory. These are automatically used in the random selection process.

2.15.2 Orbits info

Orbits info

3D Orbital Formulas

p0: -- Sprott strange attractor #1
p1: -- Sprott strange attractor #2
p2: -- Sprott strange attractor #3
p3: -- Sprott strange attractor #4
p4: -- Sprott strange attractor #5
p6: -- Latoocarfian
p7: -- Latoocarfian Mutation Alpha
p8: -- 3D Attractor (C. Pickover)
p9: -- Rossler 3D Attractor (O. Rossler)
r0: -- Lorenz 3D Attractor (E. Lorenz)
r1: -- Million-Point Sculptures (C. Pickover)
r2: -- Quadratic by Julian C. Sprott
r3: -- Modified Quadratic by Julian C. Sprott
r4: -- Chaotic Iterated Map
r5: -- Chaotic Iterated Map #2
r6: -- Flame #1(Scott Draves)

2.15.3 Ifs info

IFS Info

The 11 base forms are:

1: square
2: sierpinski triangle
3: cantor tree
4: castle
5: dragon
6: fern
7: spiral
8: dragon 2
9: snake
10: bevster
11: ivy

2.16 Keep Form

Keep Form check box

Check this box to retain the current formula, lsystem, or ifs. Useful to explore randomly a particular formula or lsystem. Note: if you switch formulas or lsystems through a FVR window, the other fractal data is not reconfigured until you press one of the channel buttons.

2.17 Channel J1

Random Julia (Channel J1 button)

A random Julia fractal is generated. Many of the rendering options of Fractal ViZion are selected on a random basis, and the Mandelbrot space for one of the hundred built-in formulas is scanned for an interesting Julia set. The palette used is also randomized. Note: In most case the Julia search is a short one, but sometimes the "seek" mode can seem to get stuck when the criteria for an interesting Julia set fails to match the formula used. In the latter case, either click the left mouse button and restart the search process, or pressing a palette key will sometimes override the current search and restart it (if HSV filtering has been selected.) Tip: some things remain to be done after the Julia set is drawn. The algorithm doesn't check the type of split palette that is used, so a mismatch in the "Divide by" color option may need correcting, e.g. Divide-by-four may be selected for a divide-by-eight palette. Feel free to experiment with all the parameters, reframe the image, change palettes etc. This routine provides a fast intro to many options in Fractal ViZion that the user may be unfamiliar with: no knowledge of fractal science/math required!

2.18 Channel J2

Random Julia (Channel J2 button)

A random Julia fractal is generated. Many of the rendering options of Fractal ViZion are selected on a random basis, and the Mandelbrot space for one of the hundred built-in formulas is scanned for an interesting Julia set. The palette used is also randomized. Note: In most case the Julia search is a short one, but sometimes the "seek" mode can seem to get stuck when the criteria for an interesting Julia set fails to match the formula used. In the latter case, either click the left mouse button and restart the search process, or pressing a palette key will sometimes override the current search and restart it (if HSV filtering has been selected.)

This is like the Random Julia command, except that more options are randomized, including spin and switch, and the Formula Type can be composite or Escher, so the search/draw time may be somewhat longer, and the results not as certain. But the images can be quite weird!

Tip: some things remain to be done after the Julia set is drawn. The algorithm doesn't check the type of split palette that is used, so a mismatch in the "Divide by" color option may need correcting, e.g. Divide-by-four may be selected for a divide-by-eight palette. Feel free to experiment with all the parameters, reframe the image, change palettes etc. This routine provides a fast intro to many options in Fractal ViZion that the user may be unfamiliar with: no knowledge of fractal science/math required!

2.19 Channel Q1

Random Quaternion (Channel Q1 button)

A random quaternion/ hypernion fractal is generated. Like Random Julia, a set of formulas appropriate for quaternions is scanned to find an interesting Julia set, and then the parameters are adjusted to produce a quaternion or hypernion image. The ranges are reset, Hj is set to 2.0, and the lighting is set for optimum viewing.

Note: for some images an hj value of 2.0 may result in a partially clipped image. Sometimes it helps to increase this value to 2.5 or 3.0, but too high a value may interfere with Solid guessing.

2.20 Channel Q2

Random Quaternion2 (Channel Q2 button)

A random quaternion/hypernion fractal is generated. Like Random Julia, a set of formulas appropriate for quaternions is scanned to find an interesting Julia set, and then the parameters are adjusted to produce a quaternion or hypernion image. The ranges are reset, Hj is set to 2.0, and the lighting is set for optimum viewing.

This option uses an extended set of formulas, not all of which may produce useable images all the time. The images can be quite different from the traditional quaternion.

Note: for some images an hj value of 2.0 may result in a partially clipped image. Sometimes it helps to increase this value to 2.5 or 3.0, but too high a value may interfere with Solid guessing.

2.21 Channel HF

Random 3D Julia Field (Channel HF button)

A 3D height field fractal is generated for a random Julia set. Like Random Julia, a set of formulas appropriate for 3D height fields is scanned to find an interesting Julia set, and then the parameters are adjusted to produce a height field image. The ranges are reset and the lighting is set for optimum viewing.

2.22 Channel LD

Random Landscape (Channel LD button)

A random 3D landscape (midpoint displacement fractal -- Formula Type 4) is generated.

2.23 Channel LS

Random Lystem (Channel LS button)

A random lsystem fractal is generated. An .ls file is selected at random from the startup directory, the palette randomized, and then a random amount of mutation is applied. The lighting is set for optimal viewing, and the figure rotated a random amount on the x y and z-axis.

2.24 Channel OR

Random Orbital (Channel OR button)

A 3D orbital fractal is generated by randomizing parameters for one of nine strange attractors. Based on Sprott's method of using random affine transformations to find interesting strange attractors.

2.25 Channel ST

Random Stalks and Bubbles (Channel ST button)

A random Julia fractal is generated using one of Paul Carlson's orbit traps or bubble method, or a custom orbit-trap formula for Newton's method renderings.

2.26 Channel NT

Random Newton/Halley (Channel NT button)

A random Julia fractal is generated using Newton's method or one of Halley's methods.

2.27 Channel HY

Random Hypercomplex (Channel HY button)

A random Julia fractal is generated with hypercomplex extensions.

2.28 Channel IF

IFS Slide Show (Channel IF button)

A random slide show of ifs images is displayed in the active view. The show is based on 11 different base forms that are randomized to create millions of variations. Press the 'home' key to see the base forms only. Press the 'end' key to display randomized images. Press the 'r' key to repeat the current form. Press the backspace key to display all forms. Press the escape key or left mouse button to end the show.

2.29 Save

Save button

Use this button to save and name the active drawing. Fractal ViZion displays the Save As dialog box so you can name your drawing.

To save a drawing with its existing name and directory, use the Save command.

2.30 Load

Load button

Use this button to open an existing data/image file in a new window. Use the Window menu to switch among the multiple open images.

2.31 Bmp

BMP radio button

Use this button to select the BMP format when loading and saving fractals. This is the default Windows bitmap format, readable by most Windows programs that use image files. This is also the fastest method of loading and saving fractals, but requires more disk space, since no compression is used. Windows keeps track of the last six BMP files saved or loaded (displayed in the Files menu.)

2.32 Png

PNG radio button

Use this button to select the PNG format when loading and saving fractals. This format uses medium compression without loss of image quality.

2.33 Jpg

JPG radio button

Use this button to select the JPEG format when loading and saving fractals. This format uses moderate compression but with some loss of image quality. Preferable for posting to the net, since most browsers can display jpeg files.

2.34 |||||

||||| button

Through a series of windows, this allows you to name and open an avi animation stream and choose a compression method. After choosing the frame rate (1-60) and using the file requester to name the file, you are given a choice of compression methods. You can also choose no compression for optimum view quality. (All compression methods degrade the original images, some more than others.) The first key frame in the stream is then drawn and written to the file.

Note: after the stream is opened, the size of the fractal that can be drawn is fixed at the size of the frame. No changes can be made to the size until the stream is closed.

2.35 >

> button

With this option, frames are written to a stream based on the difference between the current key frame and the previous key frame. The first key frame is written when you open a stream. The next key frame is created each time you use this option. In between you can zoom or change Fvr variables as much as necessary. The stream is only written to when this option is used. The last key frame is automatically saved after the 'tween' series is written. The number of frames may range from 1-1500 frames between keys. With a frame number of 1 only the key frames are written. This allows animation to be created that incorporate all scalable variables in FV.

Use the Cancel button to exit this dialog without initializing a new series of frames.

Check the Log Scaling box if you want the frames to be written with logarithmic space between frames, else linear space is used. Useful when zooming, where frames would otherwise be packed together at the end of the frame series.

2.36 []

[ ] button

Closes any open avi stream file. You need to do this before viewing the file or creating a new avi file. The stream is also closed when you exit Fractal ViZion.

2.37 V

V button

Opens an avi file for viewing. You can preview any multimedia file by clicking on its file name. A multimedia box will appear to the right of the file list. Click on okay to open the main view window.

There are buttons to Play a file forwards or Backwards, or forward automatically with Auto rewind/repeat. Click on Slow to slow down a video. Each click on Slow halves the viewing speed. A click on Stop freezes viewing and restores the view speed to normal playback.

Use the Open button to view a different avi file. Use the Save button to save the file in a different compression format. You must use a different name to save the file than the name that was used to open it. Click on the left-mouse button or any key to abort a save operation.

Note: the view avi requester can be used to preview any multimedia file, including midi files.

3 File menu

File menu commands

The File menu offers the following commands:

New	Creates a new drawing.
Open	Opens an existing drawing.
Close	Closes an opened drawing.
Save	Saves an opened drawing using the same file name.
Save As	Saves an opened drawing to a specified file name.
Load Palettes [PL]	Load palettes file.
Save Palettes [PL]	Save palettes to file.
Load Palette [MAP]	Load a Fractint map file.
Load Text [VZT]	Load text (platform-independent) data file.
Save Text [VZT]	Save data in text (platform-independent) format.
Plot to File	Write large image directly to png file.
Exit	Exits Fractal ViZion.

3.1 File New command

New command (File menu)

Use this command to create a new drawing window in Fractal ViZion. A random set of data is used to create the new window.

You can open an existing data/image file with the Open command.

Shortcuts

Keys: CTRL+N

3.2 File Open command

Open command (File menu)

Use this command to open an existing data/image file in a new window. Use the Window menu to switch among the multiple open images. See Window 1, 2, ... command.

You can create new images with the New command.

Shortcuts

Toolbar: 

Keys: CTRL+O

3.2.1 AFX_HIDD_FILEOPEN

File Open dialog box

The following options allow you to specify which file to open:

File Name

Type or select the filename you want to open. This box lists files with the extension you select in the List Files of Type box.

List Files of Type

Select the type of file you want to open.

Drives

Select the drive in which Fractal ViZion stores the file that you want to open.

Directories

Select the directory in which Fractal ViZion stores the file that you want to open.

Network...

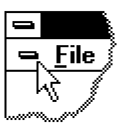
Choose this button to connect to a network location, assigning it a new drive letter.

3.3 File Close command

Close command (File menu)

Use this command to close the window containing the active image. If you close a window without saving, you lose all changes made since the last time you saved it.

You can also close a drawing by using the Close icon on the drawing window, as shown below:



3.4 File Save command

Save command (File menu)

Use this command to save the active drawing to its current name and directory. When you save a drawing for the first time, Fractal ViZion displays the Save As dialog box so you can name your drawing. If you want to change the name and directory of an existing drawing before you save it, choose the Save As command.

Shortcuts

Toolbar: 

Keys: CTRL+S

3.5 File Save As command

Save As command (File menu)

Use this command to save and name the active drawing. Fractal ViZion displays the Save As dialog box so you can name your drawing.

To save a drawing with its existing name and directory, use the Save command.

3.5.1 AFX_HIDD_FILESAVE

File Save As dialog box

The following options allow you to specify the name and location of the file you're about to save:

File Name

Type a new filename to save a drawing with a different name. Fractal ViZion adds the extension .zp.

Drives

Select the drive in which you want to store the drawing.

Directories

Select the directory in which you want to store the drawing.

Network...

Choose this button to connect to a network location, assigning it a new drive letter.

3.6 File Load Palettes command

Load Palettes command (File menu)

Use this command to load a palette file [.pl]. The palette file contains 21 palettes created previously with Fractal ViZion (or another version of the program.)

3.7 File Save Palettes command

Save Palettes command (File menu)

Use this command to save all palettes for the current session in a palette file [.pl].

3.8 File Load Palette command

Load Palette [MAP] command (File menu)

Use this command to load a Fractint-type map file. The palette in the map file replaces the currently selected palette.

3.9 File Load Text [VZT) command

Load Text [VZT) command

Load text (platform-independent) data file. Useful for transferring data files between Fractal ViZion and iViZionaire.

3.10 File Save Text [VZT) command

Save Text [VZT) command

Save data in text (platform-independent) format. Useful for transferring data files between Fractal ViZion and iViZionaire. This command is disabled for images that use the landscape, orbital, ifs, or lsystem types, or the inversion or torus options, to ensure a minimum of compatability between programs. Some differences between rendering styles may be observed, but image shapes should be maintained.

3.11 Plot to file

Plot to file

Allows you to plot a large bitmap directly to a .png file without the added system requirements of keeping the whole bitmap in memory. The Target group sets the bitmap resolution (2400X1800 to 14400X10800.) Click on Okay to set the target file name and start a new plot to file. Click on Stop to stop a file plot in progress. Click on Continue to continue a file plot that was stopped (There is no continue after you exit this routine.) Click on Exit to exit this routine. A progress bar shows the amount of plotting finished and what remains to plot. Note: the 3200X2400 bitmap size is suitable for 8 1/2X11 printouts at 320-720 dpi. The larger bitmap sizes are suitable for poster-size printouts. This option is not available for 3D plots, lsystems, or fractals that use symmetry (except vertical symmetry).

3.12 File 1, 2, 3, 4 command

1, 2, 3, 4, 5, 6 command (File menu)

Use the numbers and filenames listed at the bottom of the File menu to open the last six drawings you closed. Choose the number that corresponds with the drawing you want to open.

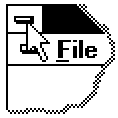
3.13 File Exit command

Exit command (File menu)

Use this command to end your Fractal ViZion session. You can also use the Close command on the application Control menu. Note: if you choose to exit while plotting, the program does not terminate, but stops the plotting so the program can be safely exited.

Shortcuts

Mouse: Double-click the application's Control menu button.



Keys: ALT+F4

4 Edit menu

Edit menu commands

The Edit menu offers the following commands:

Undo	Undo last edit, action or zoom.
Copy	Copy the active view and put it on the Clipboard.
Clip	Define area of view and copy to clipboard.
Paste	Insert Clipboard contents.
Text	Edit and add text to drawing.
Preferences	Default directories.

4.1 Edit Undo command

Undo command (Edit menu)

Use this command to undo the last action. An image can be continued after an undo, if continue was enabled before the last action. Color-cycling is disabled after using Undo, though.

Shortcut

Keys: CTRL+Z

4.2 Edit Copy command

Copy command (Edit menu)

Use this command to copy the active view to the clipboard. The entire view is copied to the clipboard.

Shortcut

Keys: CTRL+C

4.3 Edit Clip command

Clip command (Edit menu)

Use this command to copy a part of the active view to the clipboard. A zoom box is used to select the part to be copied. Click outside the view frame or press escape to exit this option.

Shortcut
Keys: CTRL+L

4.4 Edit Paste command

Paste command (Edit menu)

Use this command to paste from the clipboard. The clipboard must contain a bitmap. If the bitmap is larger than the view, it is clipped. The zoom cursor is used to set the left/top corner in the view where the bitmap will be pasted. Click outside the view frame or press escape to exit this option.

Shortcut
Keys: CTRL+V

4.5 Edit Text command

Text (Edit menu)

Allows you to edit text and font and apply it to a drawing. Select the font button to set the font style, size and color. In the text window click on Okay to add a line of text to the current image. (You can add multiple lines of text too, up to 80 characters.) The cursor will change to a crosshair. Position the cursor where you want the text to start and left-click the mouse. Note: font and title text are saved in the file "prefs.txt" in Fractal ViZion's startup directory. Title text can also be edited (as a single line only) in the Edit/Formula window.

4.6 Preferences

Preferences

This contains the default directories for loading and saving pictures, palettes, lsystems and videos.

5 Fine-Tuning menu

Fine Tuning menu

The Fine-Tuning menu offers the following commands:

Auto Sound Alert	Enable or turn off sound alerts.
Auto Time	Show time used to plot image.

The following commands can be used via the Color menu:

Divide By One Palette No split palette.
Divide By Two Palette Split palette into two sections.
Divide By Four Palette Split palette into four sections.
Divide By Eight Palette Split palette into eight sections.

Anti-Alias Use anti-aliasing, with 1X4 or 1X2 super-sampling.

5.1 Auto Alert command

Auto Sound Alert command (Fine Tuning menu)

With this command enabled (on by default), the user is notified by a sound clip when a drawing is completed or user-canceled. By disabling this command the completion exclamation is suppressed and also any alert that contains a message box. Note: some sound clips are automatically generated by Windows, or there is no text alert for a given error condition. In these cases the sound alert is unaffected by the Auto Alert command.

5.2 Auto Time command

Auto Time command (Fine-tuning menu)

With this command enabled (on by default), the time that an image takes to plot is displayed when the plot is complete. Fractal ViZion saves the condition of this option at session's end, so if you disable it and close the program, the option will be disabled when you restart Fractal ViZion.

5.3 Color menu

Color menu commands

The Color menu offers the following commands:

Cycle	Cycle colors.
Color-Scaling menu	
Palette menu	
Divide By One Palette	No split palette.
Divide By Two Palette	Split palette into two sections.
Divide By Four Palette	Split palette into four sections.
Divide By Eight Palette	Split palette into eight sections.

5.3.1 Color Divpal1 command

Divide by One Palette (Color menu)

Palette is not split before applying to pixel.

5.3.2 Color Divpal2 command

Divide by Two Palette (Color menu)

Palette is split into two parts before applying to pixel.

5.3.3 Color Divpal4 command

Divide by Four Palette (Color menu)

Palette is split into four parts before applying to pixel.

5.3.4 Color Divpal8 command

Divide by Eight Palette (Color menu)

Palette is split into eight parts before applying to pixel.

5.3.5 Color Cycle command

Cycle command (Color menu)

Use this command to cycle colors when not plotting. Works with any coloring mode, but not with hsv filtering or anti-aliasing. Undoing an action disables the cycle command until the image is redrawn.

5.3.6 Color-Scaling menu

Color-Scaling menu commands

The Color-Scaling menu (in Color menu) offers the following commands:

Escape->	Escape-time color scaling.
Level	Color scaling based on log(z).
Continuous Potential	Color scaling based on continuous potential.
Use Level	Use level curve option for all coloring.
Background	Set external points to background color.
Set Only	Plot points in complex set only.
Graded Palette->	Use non-repeating vs modulus palette.
Use Palette 1 ...	Use palette 1 for background filter.
Log High	Logarithmic mapping of level potential.

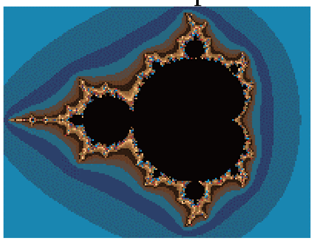
Log Low	Logarithmic mapping of reversed potential.
Continuous Potential High	Linear mapping of level potential.
Continuous Potential Low	Linear mapping of reversed level potential.
Sea Level	Set sea level at ground zero.

5.3.6.1 Escape

Escape

Five options are included that color a point based on its escape time (when it blows up.)

The Iteration option uses only the point's escape time.



Escape-time coloring.

The Iteration+ option uses the sum of a point's escape time and the value chosen (which can be picked from a menu that mirrors the Map menu.) A window is opened to set a q factor (1-200), which scales the sum value.

The Iteration* option uses the product of a point's escape time and the value chosen. .) A window is opened to set a q factor (1-200), which scales the product value.

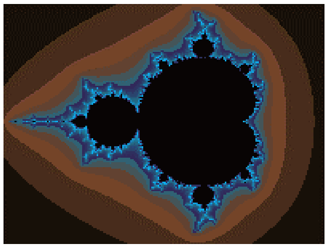
The Angle option use the absolute value of a point's exit angle (theta.) This is the atan method in Fractint.

The Angle-Iteration option uses the angle formed by the difference between a point's last two exit values and subtracts the point's escape time. Using the Angle-Only option on the Decomposition menu, escape times are not subtracted from the difference angle. This is Paul Carlson's atan method.

5.3.6.2 Level

Level

A point is colored based on its logarithmic escape. A window is opened to set a q factor, which controls the smoothness of picture color. A higher q factor results in grainier pictures and excess detail. Too low a q factor results in loss of colors and detail.

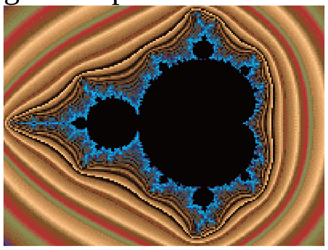


Level coloring.

5.3.6.3 Continuous Potential

Continuous Potential

A point is colored based on its continuous potential (when it blows up.) A window is opened to set a q factor, which controls the smoothness of picture color. A higher q factor results in grainier pictures and excess detail. Too low a q factor results in loss of colors and detail.



Continuous-Potential coloring.

5.3.6.4 Use Level Curve

Use Level Curve

All points are colored according to the choice selected from the Level-Curve Flag option. Defaults to Linear Map #4 if no Level Curve is checked. This works with Decomposition and other methods that would normally not use Level-Curve shading.

5.3.6.5 Set Only

Set Only

The Set Only flag plots all external points in the background color.

5.3.6.6 Background

Background

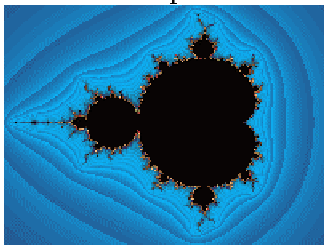
An external point is colored with the background color. This works like the Set Only flag, except with decomposition plots and Biomorph/Epsilon plots. Normally, when a point is decomposed, its escape time or level color is added to its arg (exit angle) to determine its final coloring. With Background color-scaling, only a point's arg determines its color. With Biomorph/Epsilon plots, all external points are colored with the background color and all Biomorph/Epsilon points are colored with the set color.

5.3.6.7 Graded Palette

Graded Palette

All points are colored with a non-repeating graded palette versus the default repeating(modulus) color scaling. Has no effect on the Background or Use Level Curve options, or when you use the cutoff value in the Parameters window as a color multiplier.

When used with the Escape/Iteration coloring mode and a negative cutoff value, iterations are interpolated to reduce banding in escape-time pictures. Three options are provided for smoothing. The Interpolated version works for most escape-time formulas except convergent types (Newton and renormalization.) The Mandelbrot version is based on Linas Vepstas' log log algorithm, and is designed mainly for formulas that use z^2 as their main focus, such as z^2+c. The Exponential smoothing method is based on Ron Barnett's algorithm, and works for both escape time and convergent-type fractals.



Level-graded coloring.

5.3.6.8 Use Palette

Use Palette 1 for Background Filter

This allows you to use palette 1 with a background filter, instead of the default palette, to add highlights to a picture. When Background filter is checked in the Filter window and a filter is selected, FZ uses palette 1 for any color indexes modified by the filter. This option is not available with solid-guessing.

5.3.6.9 Log High

Log High

Maps hill or mountain-type plots with a logarithmic slope based on iterations (escape time of Z.) Logarithmic slopes smooth out fast changes in point potentials. User specifies the level of the set point with the Rise box (0 to [# colors-1]).

5.3.6.10 Log Low

Log Low

Maps valley or lake-type plots with a logarithmic slope based on iterations (escape time of Z.) Logarithmic slopes smooth out fast changes in point potentials. User specifies the level of the set point with the Rise box (0 to [# colors-1]).

5.3.6.11 Continuous Potential High

Continuous Potential High

Maps hill or mountain-type plots with a logarithmic slope based on potential (the absolute value of Z when the point escapes.) This option usually produces smoother contours with the Mandelbrot set than the Log options. User specifies the level of the set point with the Rise box (0--[# colors-1]).

5.3.6.12 Continuous Potential Low

Continuous Potential Low

Maps valley or lake-type plots with a logarithmic slope based on potential (the absolute value of Z when the point escapes.) This option usually produces smoother contours with the Mandelbrot set than the Log options. User specifies the level of the set point with the Rise box (0--[# colors-1]).

5.3.6.13 Use Sea level

Use Sea Level
Imposes a water level at zero potential for 3D plots. All points below zero potential are mapped at zero to create lakes or oceans around 'land' areas.

5.3.7 Palette menu

Palette menu commands

The Palette menu (in Color menu) offers the following commands:

Palette #1-21 Use one of 21 palettes.

5.3.7.1 Palette 1-21 command

Palette command (Palette menu)

Switch to palette #. Used with palette-coloring mode.

5.4 Biomorph

Biomorph
Biomorphs test the real Z and imaginary Z values after breaking the iteration loop. If the absolute value of either is less than the preset zlimit, the point is mapped as part of the set. This method produces biological-like structures in the complex plane. Normally the biomorph tendrils are colored in the set color (the color reserved for non-divergent or inner points.) With the Set Only flag on, the tendrils are colored according to the color-scaling option used (other external points are colored in the background color.) A window is opened each time this option is selected to set a color for the area that falls within the biomorph trap. This can be 0-255.

5.5 Bioconvergence

Bioconvergence
This option relates the Biomorph method to convergence for convergent-type fractals (Newton, Renormalization and Convergence.) A pseudo-biomorphic algorithm is applied to converging points.

5.6 Biomorph Off

Biomorph Off

Turns off the biomorph flag, including bioconvergence too. Alternatively you can enter -1 in the Biomorph window to turn off the bio-flag.

5.7 Orbit traps

Orbit Traps

This includes methods that trap the orbit of a point if it comes in range of a pre-specified area or areas.

The Epsilon-Cross method colors points only if the absolute value of Z-real or Z-imaginary is less than or equal to Epsilon (a small value.) Other points are mapped at the time they blow up (exceed the zlimit.) This produces hair-like structures that branch wildly from the complex set boundaries. For the Epsilon-Inside option, the epsilon method is applied only to points included in the set. For the Epsilon-Outside option, the epsilon method is applied only to points outside the set.

The Globe method uses a circular area around the origin to map a point's orbits. This produces sphere-like structures.

The Ring method uses an area formed by two circles around the origin to map a point's orbits. This produces ring-like structures.

The Four-Circles method (Paul Carlson) uses four circular areas to map a point's orbit. This produces sphere-like structures.

The Square method uses an area formed by two squares around the origin to map a point's orbits. This produces ring-like structures with right angles.

The Petal method (Paul Carlson) also uses four trap areas to form flower-like patterns.

To produce the maximum 3-D effects (as Phil Pickard and Paul Carlson do) with these options, Level Curve #4 must be set, and the Cutoff value (in the Parameters window) should equal the negation of the epsilon value (-epsilon) or slightly less. You'll need to set up a special palette with a number of color ranges that matches the split-palette number if set. Built-in examples d3-d6 illustrate how to set up 3d-like fractals.

5.8 Newton Set

Newton Set

The Newton flag is used to map the zeros of a particular function after the Newton transformation has been applied to the function. The program doesn't make the transformation (z-(f(z)/f'(z)), where ' stands for d/dx), but it does allow you to map up to 6 attractors. Each time the Newton flag is set, a window is opened to allow you to enter up to 6 attractors (or repellers) of the function.

This flag is mutually exclusive with the Convergence and Renormalization flags, and automatically excludes all points that don't converge to one of the attractors set, within the preset number of iterations. The points that converge are colored with one of up-to-6 possible color spreads (the built-in functions may allow more colors) evenly spaced in the current palette, according to the root they converge to and the time it takes to converge. The non-converging points are mapped with the set color or their level set color (with a level flag set) after the maximum number of iterations. Non-converging points show up typically as round areas or spots.

Generally, a limit of 50 iterations gives optimum results. The Newton transformation is normally used with Julia sets, as the attractors (solutions of the formula) can be calculated beforehand. It's also possible to explore the Mandelbrot set applied to Newton's method, but only with some of the built-in formulas mentioned above. It this case, the solutions of the formula for every point on the screen have to be calculated separately, which the program does in a dedicated routine.

5.9 Newton Off

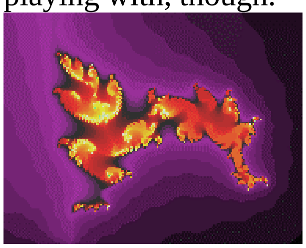
Newton Off

Turns off the Newton flag, otherwise this option is disabled.

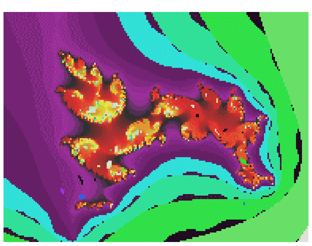
5.10 Renormalize

Renormalization

The Renormalization flag uses a hierarchical lattice transformation to map magnetic phases, with either the Julia set or Mandelbrot set as the iterated function. (Consult The Beauty of Fractals by Pietgen and Richter for appropriate formulas to use.) Basically, the default-mapping algorithm checks orbits for convergence to 1 or infinity, and scales these points in different colors. This flag is mutually exclusive with the Newton, Convergence and Boundary Scan flags. The default method of display actually only checks if z passes through 1. This is similar to the epsilon-cross mapping method. For the original renormalization formulas, there is a strong orbital attraction to 1. For other functions, this mapping produces unusual effects (with obscure mathematical foundations.) For the built-in functions, the convergence tests (type 2 or 3 and 6-8 display types) are the same as the ones used with the Newton flag. So either method produces similar results with the same formula. The differences are worth playing with, though.



Original picture



With renormalization

5.11 Convergence

Convergence

With the Convergence flag set, the program does a convergence/periodic check on all points. This is similar to the convergence checks done with Newton and Renormalization, but also the orbits of each point are saved to determine if the orbit repeats. When an orbit repeats, the iteration loop is broken and the point colored according to its break time. Depending on the iteration limit, the last 200 points of each orbit are tracked for this check. This flag is mutually exclusive with the Newton and Renormalization flags.

5.12 Default Function

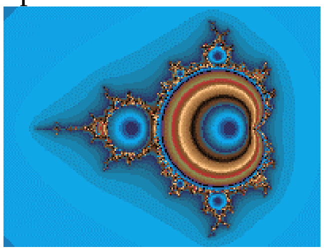
Default Function

When this option is enabled (off by default), convergent functions are iterated according to their original type. Fractal ViZion allows treating a renormalization curve as a Newton curve, or vice versa, but the governing flag must be set through the flags menu. The Default Function option allows a built-in function to work as a Newton or renormalization curve without those flags being set. Newton functions work only as Newtons and likewise for renormalization formulas. Function types that use two built-in functions can distinguish between convergent and non-convergent formulas and use the suitable escape or convergent checking for each formula.

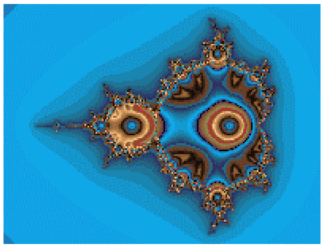
5.13 Level Curve

Level Curve

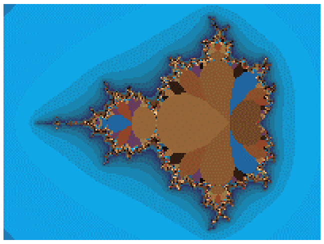
Level-curves map the set points based on how small the value of Z gets. This allows the inside of the complex set to be color-scaled. Log Map #1 produces colored bands on the inside of the complex set. Points are mapped according to what the value of z is at final iteration. Small Log #2 and Linear Map #5 produce circular patterns inside the complex set. Points are mapped according to the smallest value z gets during iteration. Indexed Log #3 and Indexed Linear #6 are mapped according to the time it takes z to reach its smallest value. Level curves 2,3(and 5,6) are described more fully in The Beauty of Fractals. Linear Map #4 is mapped like Log Map #1 (with the mapped value of the function at its final iteration applied to the color palette) and produces 3D-like effects with the Epsilon-Cross method. The Log methods use a log palette, while method #4-6 use linear palettes. This option can override (or may be overridden by) many of the options in the Color-Scaling menu. Decomposition doesn't use Level Curve shading, unless you select the Use Level Curve option.



Log Map #1



Small Log #2



Indexed Log #3

Bubble #7 uses Paul Carlson's contour-mapping method to produce 3D-like bubble pictures. The method is very sensitive to which formula is used, working best with the basic Mandelbrot set z^2+c and the like. Color-mapping should be set to Use Level Curve. This is a trial and error method that uses two other variables to produce the final effect, magnify and cutoff, as entered in the Parameters window. Magnify is used to screen unwanted background contours in the plot, while cutoff is used to fill out the color palette. Magnify should be a low value, usually less than .1, to eliminate the contours that usually appear in escape-type Mandelbrot/Julia sets. If it is too large the bubbles will be too crowded, while too small a value will cause the bubbles to disappear. Cutoff needs to be a small negative value, usually equal to the magnify value times the number of color splits. E.G., for a magnify value of .1 you should use a cutoff value of -.8 for a divide-by-eight palette. An incorrect cutoff value will cause the colors to overlap in the bubbles. For split palette pictures, the colors are divided according to their level index, as in Indexed Linear #6. The color ranges should be graded from light to dark to highlight the bubble centers.

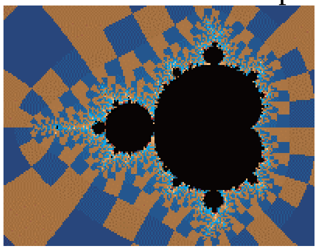
5.14 Decomposition

Decomposition

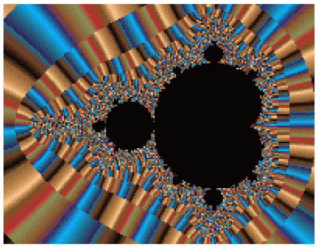
When a Decomposition flag is set, you have the option of performing either a binary or continuous decomposition. Toggle the External/Internal option for either an external or internal decomposition. The Angle-Only option excludes the Coloring-scaling options from consideration when plotting points derived from decomposition. It also excludes escape times in connection with the Angle-Iteration option on the Color-Scaling menu. An external decomposition decomposes points that are outside the complex set. An internal decomposition decomposes the complex set. For Mandelbrot/Julia curves, z-arg is broken into two parts for a binary decomposition. For Newton/Renormalization curves, the binary decomposition is also related to the number of solutions a formula has, if it supports mapping option 1. Continuous decomposition breaks z-arg into n parts, where n=angles (2-256), as set in the Continuous Decomposition window.

Note: With the graded-palette option checked, the decomposition option is extended for extra smoothness in Fractal ViZion. The number of angles is internally multiplied by 256 to track the decomposition angle more closely.

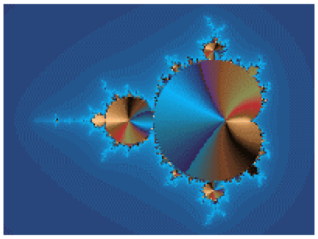
(Consult The Beauty of Fractals by Peitgen & Richter for a mathematical explanation of decomposition.) When Biomorph or Epsilon is decomposed, the tendrils or hairs are decomposed as external points. Use the Set Only flag to emphasize the tendrils and hairs when external decomposition is used.)



Binary Decomposition



Continuous External



Continuous Internal

5.15 Decomposition Off

Decomposition Off

Turns off all decomposition flags and resets the Internal/Eternal option to Eternal.

5.16 Switch

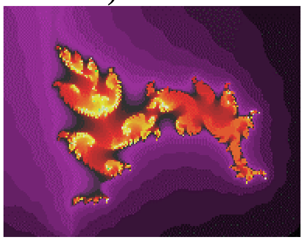
Switch

When a Switch flag is set, you have the option of switching the real and imaginary parts of Z, or switching Z for C. The real part of Z is exchanged with the imaginary part of Z after each iteration.

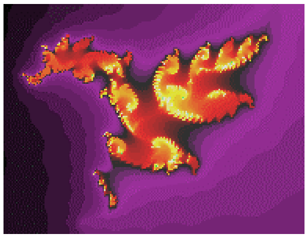
5.17 Invert

Invert

The Invert flag inverts the plane around a circle. A window is opened that allows the user to specify the circle's radius and center coordinates. Select Auto Coords to let Fractal ViZion calculate the center coordinates and circle radius. Using Auto Coords, the new radius and center coordinates are calculated when the picture is next drawn. You can zoom on an inverted picture as long as radius and center coordinates remain the same. Use the Perspective box to alter the X/Y symmetry of the inversion. A smaller Perspective value (less than 1.0) stretches the inversion in the vertical direction.



Original picture



Inverted

5.18 Invert Off

Invert Off

Turns off the inversion flag. Alternatively you can set the inversion radius to 0.0 to turn off inversion.

5.19 Torus

Torus

Pixels are mapped around a torus, and then expanded to fit the drawing area. A generalized form of Earl Hinrichs' torus method, variables are provided for center x and center y to define the c and z radii and may both equal 0.0. Results will vary with the formula used, but resembles the warping effect found in hypercomplex images. Two versions of this method are provided: the Pixel method which uses pixel values to map the torus to the fractal space, and the Two-Pi method which uses an initial rectangle 2 pi by 2 pi to map the torus to a fractal image. With the Two-Pi method, when you zoom the rectangle's size and starting points are changed to match the zooming area. The rectangle's coordinates are saved with the fractal. If you turn off the torus flag after zooming and then reinitialize the torus flag, the rectangle reverts to a 2X2 area, so the image will change accordingly. Rotating is not supported for the Two-Pi method, but does work in a limited way with the Pixel method.

5.20 Torus Off

Torus Off

Turns off the torus flag. Alternatively you can enter a negative value to turn off this flag.

5.21 Filter

Filter

Based on Stephen C. Ferguson's filter algorithms in his program Iterations, this option allows you to choose one of 29 tail-end filters to apply to any 2D plot. The name of the filter corresponds roughly to its effect on the basic Mandelbrot-squared set. The effect will vary with the formula and fractal type chosen. This overrides the Background option on the Color-Scaling menu. Useful to add detail to orbit-trap pictures, as well as perk up any otherwise ordinary picture. Filters 27-29 are generalized filters that use fn4 and fn3 (in the edit/formula window) for expanded scope. The "cross" filters use the epsilon variable from the orbit-trap window. (To set epsilon's value without applying an orbit-trap, first change the value of epsilon to the value desired, and set the orbit-trap flag. Then turn off the orbit-trap flag. Epsilon value remains unchanged when the orbit-trap flag is turned off.)

The Magnify variable is used to intensify or de-intensify the effect of the filter. This value can range from 1-500 nominally. The Add Offset box is checked when you want the filter to add an offset to the color value normally plotted. The Exclude Background box works like the Add Offset box, except that background pixels are unfiltered. With the Replace All box checked, the filter totally replaces the normal color value, which can lead to very different color-rendering. With the Background Only box checked, only pixels which would normally be colored with the background color (index 0) are filtered.

5.22 HSV Filters

HSV Filters

This option allows you to choose up to 3 hsv filters to apply to any 2D plot. These effectively extend the range of the palette used, or reassign colors independent of the limits of the palette. The filters may be assigned to modify hue, saturation or value component of the pixel's normal color. The filters may be Iteration (time-based), Z-Potential (last z), Exit Angle (polar-based), Level Index (time/magnitude based), Coloring Filter (formula/magnitude based), Z-Potential (smallest z), or Orbit Trap. Formula-type orbit traps default to Epsilon Cross for this option.

The Magnify variable is used to intensify or de-intensify the effect of the filter. Begin with 0.5 and increase or decrease as necessary.

The Start slider defines the origin of the filter so that it acts as a decrement or increment for various filter values. For the Iteration filter the values correspond to 0-Max Iterations. Start values range from 0-100 percent of the nominal filter range. For the Iteration filter, any Start value greater than 0 would make all Iterations less than the Start value decrements. The Exit Angle normally ranges from -PI to PI, so a Start value of 50 would make all angles less than 0 decrements. The Z-Potential filter has a range of 0-zlimit^2, for values that do not escape the iteration loop. For escape values, a modulus is used to bring the filter within hsv parameters. For the Level Index filter and Coloring filter, the Start slider represents a decrement/increment of -1 to 1.

The Add Offset box is checked when you want the filter to add an offset to the color value normally plotted. With the Replace All box checked, the filter uses only the offset for the color value, which can lead to very different color rendering. This differs somewhat from how the Replace All box in the Filter's windows works. Here the offset is still loosely tied to the pixel's normal color. With the Background Only flag checked, only pixels which would normally be colored with the background color (index 0) are filtered.

Notes: The Level Index filter was designed specifically for modifying a pixel's hue, though may produce interesting results applied to a pixel's saturation or value component. Hsv filtering is not available with solid-guessing. Use the Coloring Filter window to define a coloring formula. Sample coloring formula: sin(x*x)+cos(y*y).

5.23 Coloring Filter

Coloring Filter

Here you define an hsv filter based on a real function. A generalization of Earl Hinrichs' sine-wave coloring method, the function can be any formula, up to 80 characters, that uses the z components x and y. X and y are the real and imaginary parts of the last z value in the iteration loop. Sample function: sin(x+y)+cos(x*x). The Magnify slider is used to control the intensity of the filter (in conjunction with the Magnify variable in the HSV filter window.) Use the Preview button to see what the filter looks like with x and y ranges of -2pi to 2pi.

Note: the coloring filter can also be used with quaternions, ray-traced orbital fractals and 3D height fields (when the Ray Trace option is selected) to map palette indexes or spreads to the x/y ranges of these fractal types. The variable 'z' is equated to the zbuffer value in this case, so may also be included in the formula. Quaternions and ray-traced fractals normally use palette index one (the second index, zero being reserved for the background color) for their predominant color, with pixel intensities/colors affected by the lighting variables. When the coloring filter formula is defined, up to 255 colors can be used (the full palette) to create mixed textures.

The trig and exponential functions translated include sine (sin), arc sine (asn), cosine (cos), arc cosine(acs), tangent (tan), hyperbolic tangent (th), hyperbolic sine (sh), hyperbolic cosine (ch), log (log), natural log (ln), power (pow), arc tangent (atn), absolute value (abs), exponential (exp) and square root (sqr.)

The math functions are *(multiply),-(subtract),/(divide), and +(add).

The constants are PI and E (ln (1)), plus any floating-point number up to 9 digits (including the decimal point).

The power function (x to the y power) is entered in standard notation: x^y', with optional parenthesis necessary around complex exponents or variables.

Note: Range limits exist for arguments to these functions: exp, arc sine, hyperbolic sine, arc cosine, hyperbolic cosine, arc tangent, and hyperbolic tangent (+/-100.0 for the exponential , +/-200.0 for hyperbolic functions, +/-1.0 for the arc functions), the log functions (must be >0) and the power function (x must be integral and non-zero when y<0, and 0^0 is undefined). Square root is undefined for x<0. No filtering is done when these limits are exceeded.

Syntax for an acceptable formula is AS([XY])+bs([xy])...
.up to 80 characters per formula. Algebraic notation is supported to a limited degree. E.G. you can enter a variable as 2x^2, instead of 2*x*x.
A and B are optional constants.

S is an optional trig function (1 to three letters: 1 will work for sine, cosine and tangent, but use the above abbreviations for the other functions. X and Y are the standard variables. The '+' could be any of the math functions.

The parser interprets up to 10 levels of parenthesis. Use parenthesis to separate complex expressions. Use parenthesis to embed trig functions within other trig functions, etc.

5.24 Map menu

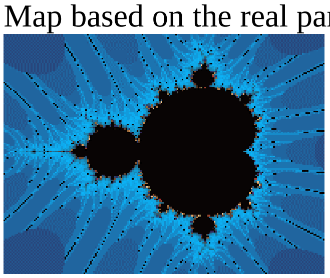
Map menu commands

The Map menu offers the following commands:

Z-Real	Mapping based on real part of z only.
Z-Imag	Mapping based on imaginary part of z only.
Abs(Z-Real)	Mapping based on absolute value of real part of z.
Abs(Z-Imag)	Mapping based on absolute value of imaginary part of z.
Z-Real + Z-Imag	Mapping based on sum of parts of z.
Abs(Z-Real)+Abs(Z-Imag)	Mapping based on absolute value of parts of z.
>Abs(Z-Real) or Abs(Z-Imag)	Mapping based on highest absolute value of parts of z.
<Abs(Z-Real) or Abs(Z-Imag	Mapping based on lowest absolute value of parts of z.
Abs(Z)	Mapping based on absolute value of z.

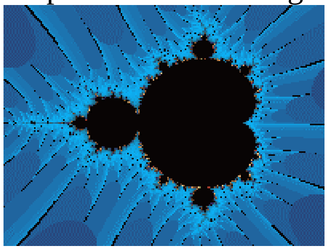
5.24.1 Z-Real

Z-Real
Map based on the real part of the complex number Z; used to map exponential Julia sets, etc.



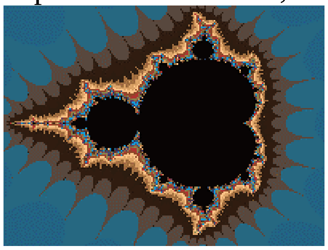
5.24.2 Z-Imag

Z-Imag
Map based on the imaginary part of the complex number Z.



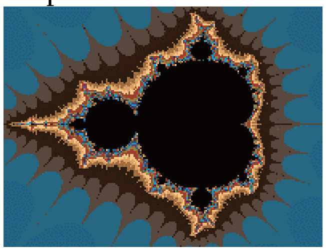
5.24.3 Abs(Z-Real)

Abs(Z-Real)
Map based on the absolute value of the real part of the complex number Z; used to map exponential Julia sets, etc.



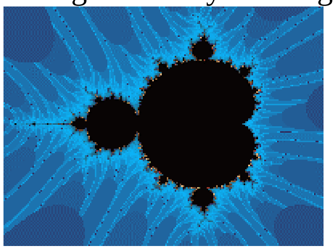
5.24.4 Abs(Z-Imag)

Abs(Z-Imag)
Map based on the absolute value of the imaginary part of the complex number Z.



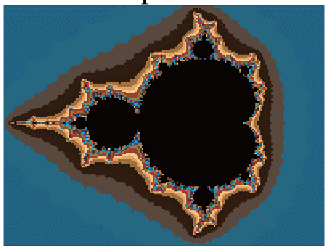
5.24.5 Z-Real+Z-Imag

Z-Real + Z-Imag
Map based on the sum of the real part and the imaginary part of the complex number Z. Changes the way banding appears in complex mappings.



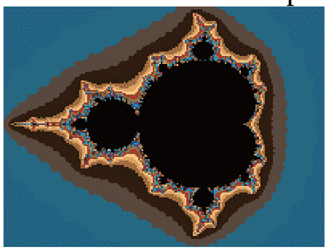
5.24.6 Abs(Z-Real)+Abs(Z-Imag)

Abs(Z-Real) + Abs(Z-Imag)
Map based on the absolute value of the real part plus the absolute value of the imaginary part of the complex number Z. Changes the way banding appears in complex mappings.



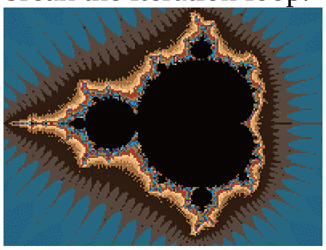
5.24.7 >Abs(Z-Real) or Abs(Z-Imag)

>Abs(Z-Real) or Abs(Z-Imag)
Map based on the greater of the absolute value of the real part or the imaginary part of the complex number Z. Works like a logical 'or', where either part of z must exceed zlimit to break the iteration loop. Changes the way banding appears in complex mappings.



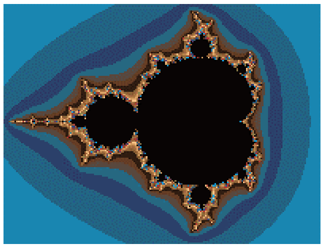
5.24.8 <Abs(Z-Real) or Abs(Z-Imag)

<Abs(Z-Real) or Abs(Z-Imag)
Map based on the lesser of the absolute value of the real part or the imaginary part of the complex number Z. Works like a logical 'and', where both parts of z must exceed zlimit to break the iteration loop. Changes the way banding appears in complex mappings.



5.24.9 Abs(Z)

Abs(Z)
Map based on the absolute value of the complex number Z (traditionally calculated by taking the square root of the sum of the squares of the real and imaginary parts of Z, but Fractal ViZion uses only the 'sum'(modulus of z) for break-point tests.) The standard method of mapping Julia and Mandelbrot sets.



5.25 Anti-Alias

Anti-Alias

Applies a 2 to 1 or 4 to 1 averaging filter to every pixel plotted, to reduce jaggies and other high-frequency noise. This increases the processing time 4 to 8 times, so is mainly a final rendering method, not for general development use. Not available for 3D-type fractals (including quaternions) or plot-to-file. Note: because of the lengthy time required for applying the anti-aliasing filter, and because anti-aliasing calculates different smoothing colors each time the palette is changed, all color-cycling and palette-switching hot keys are disabled with the anti-alias flag set.

6 View menu

View menu commands

The View menu offers the following commands:

Toolbar	Shows or hides the toolbar.
Status Bar	Shows or hides the status bar.
Zoom	Zoom into rectangle.
New View on Zoom	New view on zoom.
Phoenix Orient	Switch X/Y axis.
No Ray-Trace	Inhibits final stage of ray-tracing in 3d fractal types.
Cycle colors	Cycle colors.
Symmetry->	Horizontal, vertical or XY symmetry.

6.1 View Toolbar command

Toolbar command (View menu)

Use this command to display and hide the Toolbar, which includes buttons for some of the most common commands in Fractal ViZion, such as File Open. A check mark appears next to the menu item when the Toolbar is displayed.

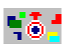
See Toolbar for help on using the toolbar.

6.1.1 toolbar

Toolbar

The toolbar is displayed across the top of the application window, below the menu bar. The toolbar provides quick mouse access to many tools used in Fractal ViZion,

To hide or display the Toolbar, choose Toolbar from the View menu (ALT, V, T).

Click	To
	Show/Hide F V Remote.
	Open an existing drawing. Fractal ViZion displays the Open dialog box, in which you can locate and open the desired file.
	Save the active drawing or template with a new name. Fractal ViZion displays the Save As dialog box.
	Cycle colors.
	Show picture full-screen.
	Solid guessing plotting mode.
	Display Fractal ViZion's User Manual.

6.2 View Status Bar Command

Status Bar command (View menu)

Use this command to display and hide the Status Bar, which describes the action to be executed by the selected menu item or depressed toolbar button, and keyboard latch state. A check mark appears next to the menu item when the Status Bar is displayed.

See Status Bar for help on using the status bar.

6.2.1 status bar

Status Bar

The status bar is displayed at the bottom of the Fractal ViZion window. To display or hide the status bar, use the Status Bar command in the View menu.

The left area of the status bar describes actions of menu items as you use the arrow keys to navigate through menus. This area similarly shows messages that describe the actions of toolbar buttons as you depress them, before releasing them. If after viewing the description of the toolbar button command you wish not to execute the command, then release the mouse button while the pointer is off the toolbar button.

The right areas of the status bar indicate which of the following keys are latched down:

Indicator	**Description**
CAP	The Caps Lock key is latched down.
NUM	The Num Lock key is latched down.
SCRL	The Scroll Lock key is latched down.

6.3 Zoom

Zoom (View menu)

Turns on zoom mode, so that detail of the current plot may be magnified. Alternatively, just click inside any drawing window, move the mouse, and the zoom box will appear. Using the mouse, move the zoom box over the portion of the plot you wish to magnify. Hold the left mouse button to shrink the box or the right button to enlarge it. Use the left and right arrow keys to rotate the box counter-clockwise or clockwise. Use the up and down arrow keys to squash or expand the box, changing the aspect of the image. You start a zoom by pressing the space bar. You abort a zoom by clicking outside the main window or in the title bar, or by pressing the escape key. The program will begin a new plot at the new coordinates. You may zoom in by defining a box inside the current drawing area. You zoom out by drawing a box outside the current drawing area. The outer zoom limits are between -1000 and 1000. The precision is that of double precision (64 bits)

Notes: Zooming in a three-dimensional plot is not supported, nor is zooming on a random (midpoint displacement) fractal or lsystems fractal. If you change screen resolutions, you must redraw the bitmap image for a function before you can accurately zoom on it.

Zooming with orbital-type fractals turns on magnify mode, so that details of the current screen may be examined. The selected area is magnified to fill the current sector or screen. The x and y ranges do not change though, so the magnified area may not show up all at once, since other areas of the function may have to be recalculated first.

Rotating is not supported with orbital fractals or fractals that use symmetry on one or more axis.

6.4 Image New View on Zoom command

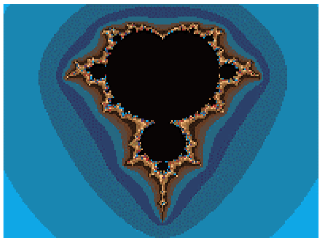
New view on zoom (View menu)

With this option enabled, a new window is opened with each zoom, instead of the zoom box area replacing the original image. Disabled in video or batch mode.

6.5 Phoenix

Phoenix Orient (View menu)

The Phoenix flag rotates the planes, so that the imaginary plane is mapped horizontally and the real plane is mapped vertically.



6.6 No ray-trace

No Ray-Trace (View menu)
When this option is selected, the last stage of ray-tracing in 3D fractal types is prevented. Therefore, you end up with the intermediary colors in the image, which you see while the image is drawing. The way Zplot used to work, before I added ray-tracing, surface formulas and Phong highlights. For some, the simpler coloring method may be of interest.

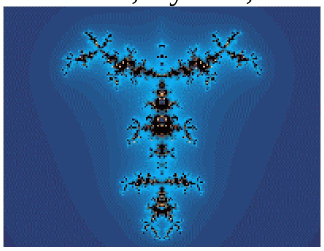
6.7 Color Cycle command

Cycle command (View menu)

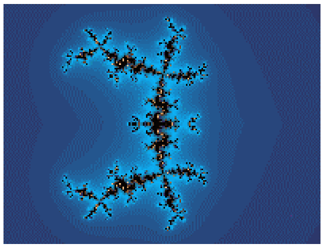
Use this command to cycle colors when not plotting. Works with any coloring mode, but not with hsv filtering or anti-aliasing. Undoing an action disables the cycle command until the image is redrawn.

6.8 Symmetry

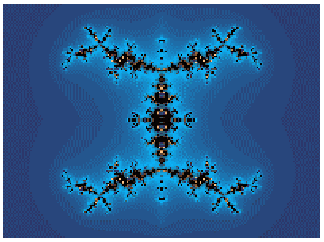
Symmetry (View menu)
This produces a mirror image from left to right (vertical) or top to bottom (horizontal) or both (xy). You can zoom with symmetry, but the results will be uncertain if the zoom box is off-center on the window or if rotation is used. Symmetry has no effect when used with the 3D Julia field, lsystem, orbital or landscape fractals.



Vertical symmetry



Horizontal symmetry



XY symmetry

7 Window menu

Window menu commands

The Window menu offers the following commands, which enable you to arrange multiple images in the application window:

Cascade	Arranges windows in an overlapped fashion.
Tile	Arranges windows in non-overlapped tiles.
Arrange Icons	Arranges icons of closed windows.
Size Desktop	Size drawing area to window frame.
Window 1, 2, ...	Goes to specified window.

7.1 Cascade

Cascade command (Window menu)

Use this command to arrange multiple opened windows in an overlapped fashion.

7.2 Tile

Tile command (Window menu)

Use this command to arrange multiple opened windows in a non-overlapped fashion.

7.3 Arrange

Window Arrange Icons Command

Use this command to arrange the icons for minimized windows at the bottom of the main window. If there is an open drawing window at the bottom of the main window, then some or all of the icons may not be visible because they will be underneath this drawing window.

7.4 Size DeskTop

Window Size DeskTop Command

Use this command to size the active drawing window to its frame size. Use after Tile command to reduce white space around a drawing that is smaller than screen size.

7.5 1, 2, ...

1, 2, ... command (Window menu)

Fractal ViZion displays a list of currently open drawing windows at the bottom of the Window menu. A check mark appears in front of the drawing name of the active window. Choose a drawing from this list to make its window active.

8 Help menu

Help menu commands

The Help menu offers the following commands, which provide you assistance with this application:

Getting Started	Tutorial for new users of Fractal ViZion.
User Manual	Offers you an index to topics on which you can get help.
Hot Keys	Quick reference to Fractal ViZion's hot keys.
Built-in Formulas	Quick reference to Fractal ViZion's built-in formulas.
Bibliography	Sources for fractal information and complex numbers.
About Fractal ViZion	Displays the version number and author info for this application.

8.1 Getting Started

Getting Started

Welcome to Fractal ViZion!

This is a short tutorial that will cover some of the basic commands to make the most of Fractal ViZion. For help on any menu command, press shift-F1 while the command is highlighted.

When Fractal ViZion is first started, a random fractal is automatically generated. There are twelve channels of randomly generated fractals that can be accessed via Fractal ViZion's remote. Use the toolbar icon to hide/show the remote, or Ctrl-R. Since most fractals FV is capable of generated are configured automatically, including a random palette, I will touch briefly on some of the things a new user might want to explore to enhance the fractals created thus. In the end, the enhancements and touchups are what will give your fractals their unique personality.

The most basic changes to a fractal are coloring and framing. Use the palette editor to modify colors on a fractal. In some cases, the fractal will need to be redrawn to show the color changes, while other fractals that can be color-cycled will show the color changes immediately. You can zoom on most fractals by clicking in the draw window and using the mouse buttons to enlarge/shrink the zoom box, and use the left/right arrow keys to rotate the zoom box. Press the space bar to redraw the fractal using the new zoom coordinates, or click on the window's frame or title bar to abort a zoom. Note: zooming is not available on lsystem or landscape fractals, and rotating may be disabled when some types of symmetry are used.

Additional changes to the fractal may be made via the FVR button on the FV remote. Most fractal types have additional variables that can be varied for animation purposes or for general esthetics. Some specialized filters can be applied to the fractal via the Fine-Tuning menu, and symmetry can be altered via the View menu.

This completes the Getting Started tutorial. Be sure to read the hot keys, palette editor and remote sections for additional info. The Bibliography lists additional reference material for a better understanding of the fractal types and functions contained in Fractal ViZion.

8.2 User Manual

User Manual (Help menu)

Use this command to display the opening screen of Help. From the opening screen, you can jump to step-by-step instructions for using Fractal ViZion and various types of reference information.

Once you open Help, you can click the Contents button whenever you want to return to the opening screen.

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8.4 Built-in Formulas

Built-in Formulas

p0 -- z^2+c --- the standard Mandelbrot or Julia set.
p1 -- cz(1-z) --- the self-squared dragon set.
p2 -- c(z-1/z) --- alternate Mandelbrot or Julia set.
p3 -- cz^2-1 --- alternate Mandelbrot or Julia set.
p4 -- c^2/(c+z^2) --- alternate Mandelbrot or Julia set.
p5 -- z^3+c --- cubic Mandelbrot or Julia set.

p6 -- ((z^2+c-1)/(2z+c-2))^2 -- renormalization formula #1 for x-plane or q-plane pictures.
p7 -- z^2+j+kzn --- Phoenix curve (Ushiki).
p8 -- Julia/Mandelbrot set (modified from M. Barnsley).
p9 -- fn(z)-cfn(z) -- generalized frothy basin (J. Alexander.)

r0 -- Newton/Halley map of z^3+conj(z)c -- exploratory function based on modified frothy basin.
r1 -- z^z+z^s+c
r2 -- z^s-z+c
r3 -- fn(z)+exp(z)+c
r4 -- solves Newton/Halley transformation of (z^2-c)(z+1).
r5 -- cfn(z) -- transcendental Julia curve.
r6 -- cexp(z) -- exponential Julia curve, etc. with additional plane checking when real value of Z exceeds 50. If cos(imag-Z) >= 0, point is considered part of Julia set.
r7 -- fn(z)+cfn(z)+1 -- generalized form of t9.
r8 -- foggy coastline #1 Mandelbrot IFS (M. Barnsley).
r9 -- foggy coastline #2 Mandelbrot IFS (M. Barnsley).

e0 -- solves Newton/Halley transformation of (z+j)(z+k)(z^2+1)
e1 -- solves Newton/Halley transformation of (z+j)(z^2+z+k)
e2 -- solves Newton/Halley transformation of (z-1)(z^2+z+c)
e3 -- solves Newton/Halley transformation of (z+j)(z+k)(z+1)
e4 -- Chaos Game Julia IFS (M. Barnsley).
e5 -- snowflake Julia IFS (as described in Fractals Everywhere by M. Barnsley).
e6 -- solves Newton/Halley transformation of logz-c.
e7 -- solves Newton/Halley transformation of exp(z)-c.
e8 -- solves Newton/Halley transformation of (z-c)(z+1)(z-1)
e9 -- solves Newton/Halley transformation of (z-c)(z+c)(z^2+c^2) --- z^4-c^4.

s0 -- solves Newton/Halley transformation of sinz-c.
s1 -- sexpz+c -- transcendental Julia set.
s2 -- c(1+z^2)^2/(z^2-1) -- alternate Julia set.
s3 -- solves Newton/Halley transform of tan(z)-c .
s4 -- IFS (x=sy+j,y=-sx+k (x>0); else x=sy-j,y=-sx-k (modified from M. Barnsley)
s5 -- solves Newton/Halley transform of z^s-1.
s6 -- composite function cz-c/z & z^2+c (C. Pickover).
s7 -- transcendental function fn(z)+c .
s8 -- ((z^3+3(c-1)z+(c-1)(c-2))/(3z^2+3(c-2)z+c^2-3c+3))^2 -- renormalization formula #2 for x-plane or q-plane pictures .
s9 -- Newton/Halley map of z(z^limit-1).

t0 -- Newton/Halley map of z(z^limit-c)
t1 -- Newton/Halley map of Chebyshev function cos(n*arccos x).
t2 -- Newton/Halley map of Hermite polynomial: 16x^4-48x^2+12.
t3 -- alternate Newton/Halley map of tanz-c
t4 -- Newton/Halley map of z^limit-c
t5 -- fn(fn(z))+c -- user-defined complex set. When the first function is z^2 and the second

function is conj(z), this becomes the z-conjugate set, zz^2+c, the tricorn set.
t6 -- Volterra-Lotka equations discretized by modified Huen method (from The Beauty of Fractals).
t7 -- c^z+c -- tetration of z.
t8 -- q^2+c -- Quaternion set (from Computer, Pattern, Chaos and Beauty)
t9 -- z+cz+1

a0 -- spiral network -- C. Pickover.
a1 -- z-(1/z+c) -- try with renormalization applied. Sequel to t9.
a2 -- fn(z)-(fn(z)+c) -- generalized form of a1.
a3 -- alternate Newton/Halley map of sinz-c.
a4 -- user-defined complex set: fn(z)+fn(z)+c.
a5 -- hypercomplex Newton/Halley map of h^3+c.
a6 -- Hypercomplex Newton/Halley map of fn(h)+c.
a7 -- user-defined complex set: fn(z)+fn(c).
a8 -- fn(z)+zn+c -- from Fractal Creations.
a9 -- q^3+c -- cubic Quaternion set.

b0 -- alternate Newton/Halley map of exp(z)-c.
b1 -- alternate Newton/Halley map of log(z)-c.
b2 -- Newton/Halley map of phoenix curve.
b3 -- cfn(z)+zn -- user-defined complex formula.
b4 -- fn(z)+kzn+j -- generalized phoenix curve formula.
b5 -- fn(z) a preformula for use with type 3 composite fractals. uses limit gadget to select function.
b6 -- Newton/Halley map of fn(z)+fn(z)+c.
b7 -- Newton/Halley map of cfn(z).
b8 -- fn(z)*fn(z)+c.
b9 -- Newton/Halley map of foggy coastline #1.

c0 -- Newton/Halley map of foggy coastline #2.
c1 -- Newton/Halley map of fn(fn(z))+c.
c2 -- cfn'(z), where fn'(z)=first derivative of user-defined function.
c3 -- fn(z)+fn'(z)+c.
c4 -- fn'(z)+fn(c).
c5 -- fn(fn'(z))).
c6 -- first order gamma function: (z/e)^z*sqr(2*pi*z)+c.
c7 -- Newton/Halley map of fifth degree Legendre polynomial: 1/8(63z^5-70z^3+15z
c8 -- (z^2+e^(-z))/(z+1): second-order convergence formula for finding root of ze^z-1=0.
c9 -- Newton/Halley map of fn(z)*fn(z)+c.

d0 -- z^s/limit+c: anti-derivative of z^n
d1 -- Sterling expansion of gamma function: (z/e)^z*sqr(2*pi/z)+c.
d2 -- Newton map of fn'(z)-fn(z)+c: generalized first degree Laguerre polynomial.
d3 -- fn(1/(fn(z)+c)).
d4 -- z^2-c; where zreal=abs(zreal)(Paul Carlson's "alien" Julia set).
d5 -- z^2; where zreal=abs(zreal)-cr, zimag=zimag-ci (Paul Carlson Julia set).

d6 -- cfn(z)+c.
d7 -- Newton's method applied to (x^3+y^2-cr=0 and y^3-x^2+ci=0). from Sylvie Gallet and Fract19.par.
d8 -- Newton's method applied to fn1(x)+fn2(y)-cr=0 and fn3-fn4+ci=0
d9 -- Bill13 from Bill Rossi via the Internet.
f0 -- generalized form of Earl Hinrichs' sophomore sine function(ssin) -- limit*fn(z)+s+si, where fn(z)=(fn1(x),fn2(y)).
f1 -- c^2/(1-cz^2) -- variant of p4.
f2 -- Gallet-4-01, from Sylvie Gallet's extensive Internet collection
f3 -- Gallet-4-02, from Sylvie Gallet.
f4 -- Gallet-6-01, from Sylvie Gallet.
f5 -- Gallet-6-02, from Sylvie Gallet.
f6 -- Gallet-6-03, from Sylvie Gallet.
f7 -- Gallet-6-04, from Sylvie Gallet.
f8 -- Gallet-6-05, from Sylvie Gallet.
f9 -- Gallet-7-01, from Sylvie Gallet.

Note: the term 'fn(w)' represents any one of 47 user-defined functions.
0: sin(w). 1: sinh(w). 2: cos(w). 3: cosh(w).
4: tan(w). 5: tanh(w). 6: exp(w). 7: ln(w).
8: w^c 9: w^z. 10: 1/w. 11: w^2.
12: w^3. 13: abs(w). 14: sqrt(w). 15: w.
16: conj(w). 17: csc(w). 18: csch(w). 19: sec(w).
20: sech(w). 21: cot(w). 22: coth(w). 23: cw.
24: 1. 25: arsin(w). 26: arcsinh(w).
27: arccos(w). 28: arccosh(w). 29: arctan(w).
30: arctanh(w). 31: arccot(w). 32: arccoth(w).
33: vers(w). 34: covers(w). 35: L_3(w): 3rd degree Laguerre polynomial. 36: gamma(w): first order gamma function.
37: G(w): Gaussian probability function -- (1/sqr(2pi))*e^(.5w^2).
38: c^(s+si). 39: zero. 40: w^(s+si). 41: |(wx)|+|(wy)|*i(abs).
42: wy+wx*i(flip). 43: conj(cos(w))--cosxx. 44: theta(w) -- polar angle(w).
45: real(w). 46: imag(w).
When only fun#1 or fun#2 is used and a single user-defined function is involved, the function is taken from f1. When two user-defined functions appear in a function, the f2 gadget supplies the second function type, except as noted below. For plots that use both fun#1 and fun#2(type 2 or 3, etc), fun#1 takes its functions from f1 and f2 and fun#2 takes its functions from f3 and f4.

8.5 Hot Keys

Hot keys

F1-F9,F11, 0-9 --- change to one of 21 color palettes -- useable during plotting.
F12 holds the palette of the most recently loaded function.

Tab --- Replaces the currently selected palette with the palette in F11.
Useful when you want to make a palette file (.pl) from the palettes in a lot of individual bitmap files. Use the copy data and paste data commands to move the palette from another drawing window into F11. Select the palette (F1-F9, F12, 0-9) you want to move F11 into, and then press Tab.

up arrow --- forward cycle colors one step, including set color -- useable during plotting.
down arrow --- back cycle colors one step, including set color -- useable during plotting.

Shift-F -- generate a Julia set from a formula's MandelbrotP space. Random points in a formula's current Mandelbrot space are scanned for an interesting Julia set.

Shift-C -- clear the screen to the current background color.

Shift-T -- annotate a picture with text. Cursor changes to a crosshatch, which you position over the area where you want the text to start. Then click the left-mouse button to transfer any text (from the Edit/Text window) to the picture. Can be used with Undo. Use the Edit/Text command to change font, text color or format text into multiple lines. This is useful for adding copyright/author info to a finished picture.

8.6 About Fractal ViZion

About Fractal ViZion

>>>>> Fractal ViZion™ v3.037 ©1998 - 2008 by Terry W. Gintz

Fractal ViZion graphs formulas based on 4-D complex number planes. Fractal ViZion currently supports Julia sets (derived from Mandelbrot space), with millions of mapping variations. 3D plot types now include quaternion, hypernion, orbital fractals and lsystems, in addition to the original height-field type. The complex math functions supported include sin(z), sinh(z), z^z, e^z, z^n, sqrt(z), cos(z), cosh(z), tan(z), tanh(z), log(z), ln(z), n^z and others, including the gamma and Legendre functions.

Up to two formulas for z using the above functions may be plotted, using traditional rules for generating Julia sets (G. Julia.) Also, there are mapping options that use non-traditional methods, such as the epsilon-cross method (Clifford A. Pickover), renormalization and IFS (Michael Barnsley). There are 100 built-in formulas for Julia sets, 9 strange attractor formulas for orbital fractals, and 90 .ls files for random lsystem generation (These methods and formulas are all selected and adjusted automatically by Fractal ViZion.)

Fractal ViZion requires a true-color video adapter for best results. It may work in 16-bit (high color), but this hasn't been tested thoroughly.

Memory requirements for Fractal ViZion vary with the size of the drawing area Fractal ViZion opens on, ranging from approximately 3 megabytes memory for a 640X480 area to 48 megabytes for a 2048X1536 area. Special routines have been added to reduce memory requirements for large bitmaps (up to 14400X10800) by writing these directly to a file instead of using a memory bitmap.

Acknowledgements: many thanks to Paul Carlson for providing me his algorithms for 3D-like fractals, and allowing me to incorporate his ideas into Fractal ViZion. Also, special thanks to Ron Barnett for his help in setting up the animation routines, to Earl Hinrichs for sharing his unique programming methods on the fractal art and programmer's lists, to Frode Gill for his quaternion and ray-tracing algorithms, to Dirk Meyer for his Phong-shading routines, and to Laurens Lapre's for his great 3D extensions to traditional lsystem methods. The multi-windowing interface in Fractal ViZion is courtesy of that extraordinary and prolific fractal programmer, Steven C. Ferguson, whose filters I have also included in FV. Steve's contributions to the look and feel of Fractal ViZion and previous versions of my program have had a deep impact on my fractal imaging experiments. Last but not least, remercia te trиs beaucoup, to Jean-Pierre Louvet, for his timely suggestions for improving ZPlot 24, Fractal Elite and Dofo-Zon.

For a short history of this program, see Chronology.

8.6.1 Chronology

Chronology

History of this program:

In September 1989, I first had the idea for a fractal program that allowed plotting all complex functions and formulas while attending a course on College Algebra at Lane College in Eugene, Oregon. In November 1989, ZPlot 1.0 was done. This Amiga program supported up to 32 colors, 640X400 resolution, and included about 30 built-in formulas and a simple formula parser.

May 1990 -- ZPlot 1.3d -- added 3D projections for all formulas in the form of height fields.

May 1991 -- ZPlot 2.0 -- first 236-color version of ZPlot for Windows 3.0.

May 1995 -- ZPlot 3.1 -- ZPlot for Windows 3.1 -- 60 built-in formulas. Added hypercomplex support for most built-in formulas.

May 1997 -- ZPlot 24.02 -- first true color version of ZPlot -- 91 built-in formulas. Included support for 3D quaternion plots, Fractint par/frm files, Steve Ferguson's filters, anti-aliasing and Paul Carlson's orbit-trap routines.

June 1997 -- ZPlot 24.03 -- added Earl Hinrichs Torus method.

July 1997 -- ZPlot 24.08 -- added HSV filtering.

December 1997 -- Fractal Elite 1.14 -- 100 built-in formulas; added avi and midi support.

March 1998 --Split Fractal Elite into two programs, Dreamer and Medusa(multimedia.)

April 1998 -- Dofo 1.0 -- supports new Ferguson/Gintz plug-in spec.

June 1998 -- Dofo-Zon -- redesigned multi-window interface by Steve Ferguson, and includes Steve's 2D coloring methods.

August 1998 --Dofo-Zon Elite -- combination of Fractal Elite and Dofo-Zon

October 1998 -- Dofo-Zon Elite v1.07 -- added orbital fractals and IFS slide show.

November 1998 -- Dofo-Zon Elite v1.08 -- added lsystems.

April 1999 -- Split Dofo-Zon Elite into two programs: Fractal Zplot using built-in formulas and rendering methods, and Dofo-Zon to support only plug-in formulas and rendering methods.

May 1999 -- Added random fractal methods to Fractal Zplot 1.18.

June 1999 -- completed Fractal ViZion -- first version with automatic selection of variables/options for all fractal types.

July 1999 -- Fractal Zplot 1.19 -- added cubic Mandelbrot support to quaternion option; first pc fractal program to render true 3D Mandelbrots.

September 2000 -- Fractal Zplot 1.22 -- added support for full-screen AVI video, and extended quaternion design options.

October 2000 -- QuaSZ (Quaternion System Z) 1.00 -- stand alone quaternion/hypernion/cubic Mandelbrot generator

November 2000 -- Added octonion fractals to QuaSZ 1.01.

March 2001 -- Cubics 1.0 -- my first totally-3D fractal generator.

May 2001 -- QuaSZ 1.03 -- added Perlin noise and improved texture mapping so texture tracks with animations.

June 2001 -- Fractal Zplot 1.23 -- added Perlin noise and quat-trap method.

July 2001 -- QuaSZ 1.05 -- improved performance by converting many often-used dialogs to non-modal type.

October 2001 -- FraSZle 1.0, QuaSZ formula and algebra compatible version of Fractal Zplot

November 2001 -- DynaMaSZ 1.0, the world's first Dynamic Matrix Systems fractal generator

May 2002 -- DynaMaSZ SE 1.04 (unreleased version)-- scientific edition of DMZ, includes support for user-variable matrix dimensions (3X3 to 12X12)

January 2003 -- Pod ME 1.0 -- first stand-alone 3-D loxodromic generator, Hydra 1.0 -- first 3-D generator with user-defined quad types and Fractal Projector a Fractal ViZion-like version of DMZ SE limited to 3X3 matrices

May 2003 -- FraSZle and Fractal Zplot 3.052 -- added random 3D orbital fractals, new 3D export methods, upgraded most frequently-used dialogs to non-modal type and added genetic-style function type. FZ now based on FraSZle except for built-in formula list and Newton support.

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