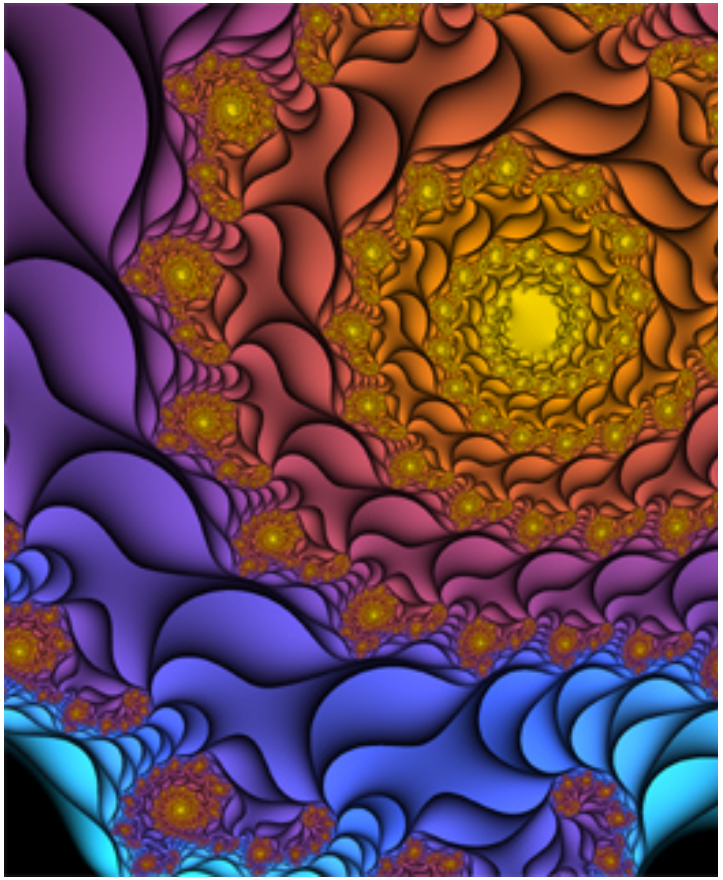
KPT FRAXPLORER



What's in this Section:

Overview

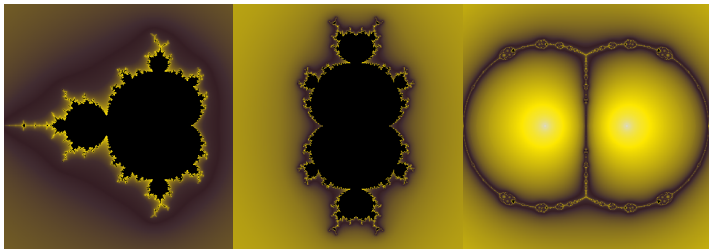
KPT KPT FraxPlorer is the next generation of the Fractal Explorer from KPT 2.1. It adds new fractal algorithms, and coloring styles.

We've also broken entirely new ground in the world of fractal mathematics by coming up with a new way to do near infinite zooms. This isn't possible anywhere else!

If you want a little background on fractals, refer to "What are Fractals?" on page 18.

Exploring Fractals

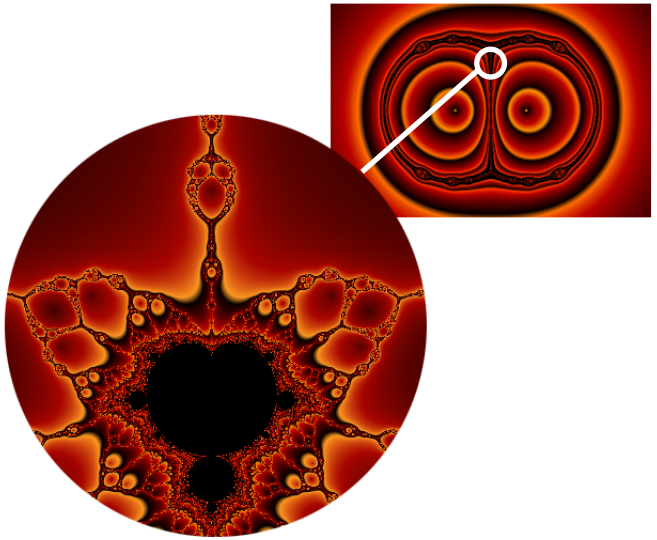
KPT KPT FraxPlorer lets you explore fractal space using the Universe Mapper panel. You begin exploring by choosing from one of three base fractal families: Mandelbrot, Mandelcube and Newtonbrot.



Mandelbrot **Mandelcube** **Newtonbrot**

Examples of the three main fractal types.

These three fractal types are fairly common and unvaried. You can explore them by moving to different points in the fractal or by zooming in and out of different areas. Like all fractals, they all have infinite detail so there's plenty to see.



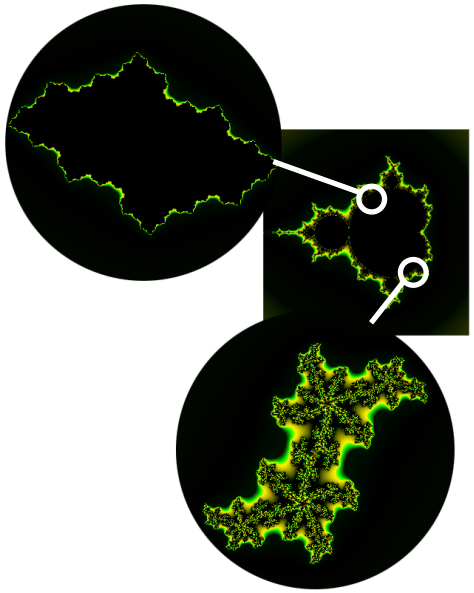
Exploring a Newtonbrot set.

The base fractals are only three of the twelve fractal spaces you can explore with KPT FraxPlorer. For each base fractal you can explore three other spaces: Julia Variations, M-Polar variations, and Julia Polar variations.

Exploring Julia Variations

A Julia Set fractal exists at every point in a base fractal. Julia Set fractals are simpler than Mandelbrot or Newtonbrot fractals, but there are an infinite number of Julia Sets while there is only one Mandelbrot.

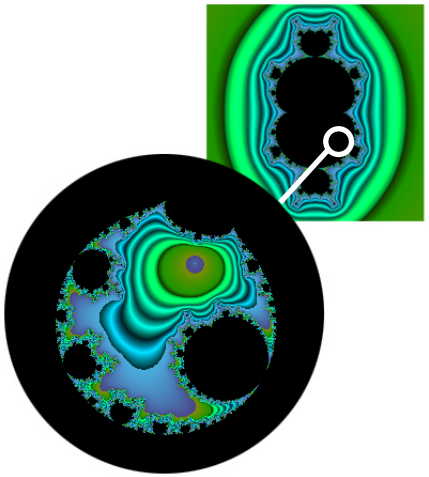
As you move around the general base fractal (for example, a Mandelbrot), you'll find the Julia Set that exists at that point. Since one derives from the other, there's a visual correspondence between the base fractal and the Julia variation. For example, when you move to a black area of the base fractal, the Julia will have a black center and so forth.



Exploring the Julia Set variations in a Mandelbrot fractal.

Exploring Polar Variations

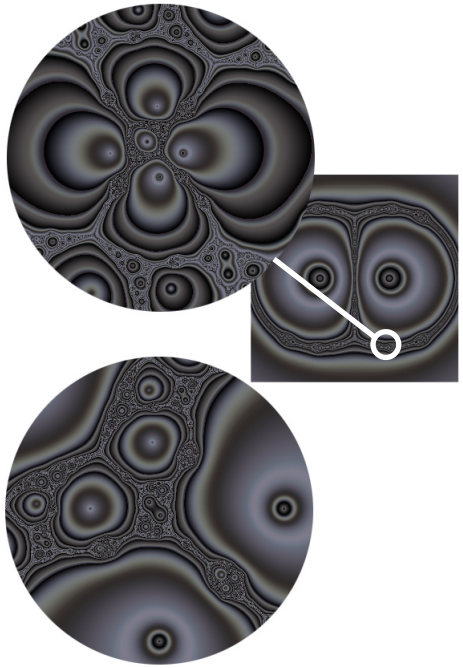
To generate a polar variation, KPT FraxPlorer takes a point on the base fractal and turns it inside out. So, if you move to a point on the base fractal where the inside is black and the outside is colored, the polar variation will have color in the inside and black on the outside.



Exploring the M-Polar set variations in a Mandelcube fractal.

Exploring M-Julia Polar Variations

To generate M-Julia Polar variations, KPT FraxPlorer finds the Julia Set at the point on the base fractal and then turns it inside-out. So, for every point on the base fractal, you'll get an inverted Julia Set fractal.

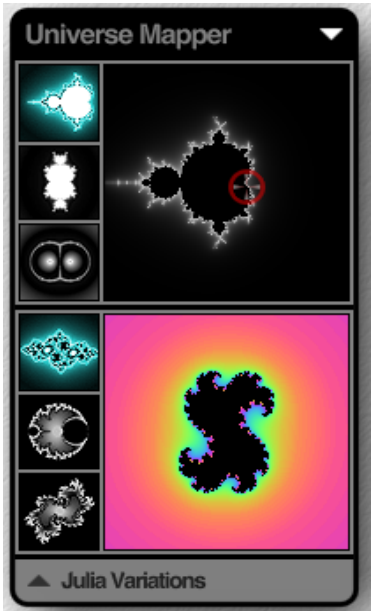


Julia Variation at the same point

Exploring the Julia Polar set variations in a Newtonbrot fractal.

Using the Universe Mapper

The top portion of the Universe Mapper panel lets you choose one of the three base fractal types. The top preview window is both a preview and a locator. The locator icon tells you the current source of the Julia variation displayed in the bottom preview.



When you first access the Universe Mapper only the top portion is visible. When you click the arrow icon, the bottom portion appears.

The bottom portion of the panel displays the variations. The three icons along the left let you choose which variation of the base fractal you want to explore.

To choose a fractal type:

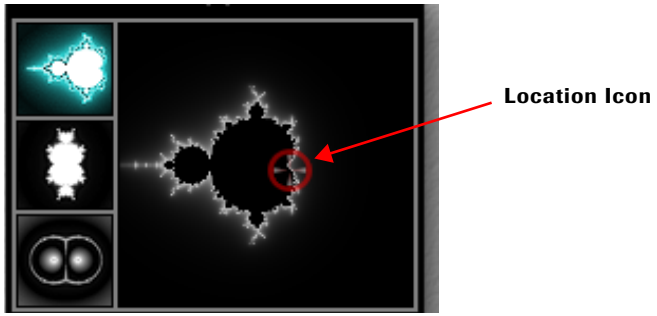
1 Click one of the three base fractal types.

If you want to explore the base fractal further, click the OK button and use the Navigator controls to zoom into the fractal.

2 Click the arrow icon at the bottom of the panel to display the variations.

3 Click one of the three variation types. The new variation appears in the bottom preview window.

4 Drag the location icon over the base fractal, in the top portion of the panel, to explore the variations.



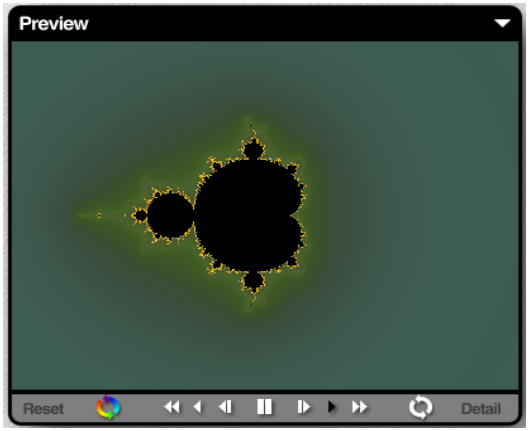
Drag the location icon to explore different variations.

5 When you have a fractal you're happy with, click the OK button. The new fractal appears in the Main Preview window.

Navigating in a Fractal

Since fractals have infinite detail, the default preview of a fractal is not all there is to see. When you explore the infinite patterns within the fractal, you'll see what makes fractals really unique.

The Main Preview window acts like a large view-finder, allowing you to zoom in and out of different parts of the fractal.



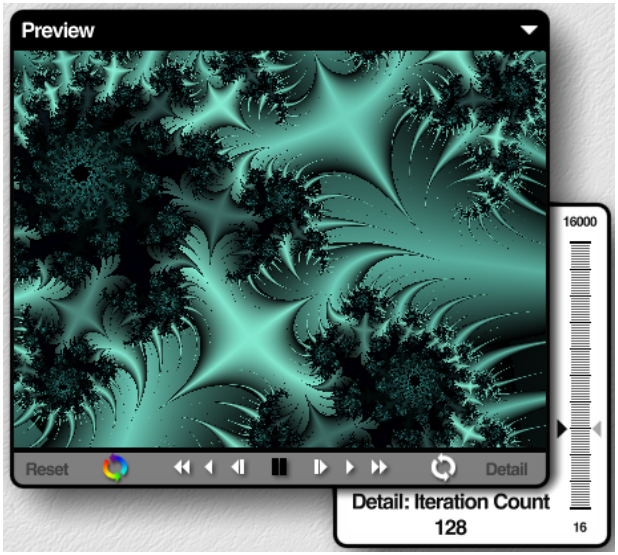
Use the controls in the Main Preview window to explore your fractal.

Using Navigation Controls

The controls along the bottom of the Main Preview window control the speed and direction of your zoom as well as provide controls for rotating, color cycling and fractal detail.

In general, you can start zooming by clicking anywhere in the Main Preview window. During a zoom, you can change direction by dragging the cursor in the direction you want to move.

When you click one of the tools, an expanded slider appears that lets you set the zoom or rotate value precisely.



When you click a control, the expanded slider appears.

Reset — Resets the view.

Enables animated color cycling. Cycles through gradient colors.

Zooms out of a location quickly

Zooms out of a location at a slower rate.

Zooms out of the location one click at a time. Drag a selection area to zoom out of a specific area.

Suspends zooming. When zooming stops, you can drag inside the preview window to pan your fractal.

Zooms in to a location one click at a time. Drag a selection area to zoom into a specific area.

Zooms in to a location at a slower rate.

Zooms in to a location quickly.

Rotates fractal. Click the tool, then drag in the Main Preview window.

Setting Fractal Detail

The Details control sets how many times KPT FraxPlorer loops through the fractal equation. Each time it loops through, it calculates more of the fractal. So, the higher the Detail setting, the more detail you'll see in the fractal.

If you find blank areas in your fractal, it's probably because KPT FraxPlorer is not calculating the fractal at that point (this usually happens when you zoom in really far). Try increasing the Detail value. After a few calculations, you'll be able to see the portion of the fractal that exists at the current location.

Setting Preview Options

KPT FraxPlorer's Main Preview window has two preview options that let you control the quality of the rendered preview. The options are mutually exclusive. You can use one or the other, not both.

Smoother Zooming

When this option is enabled, the zooming animation in the Main Preview window is smoother. However, the fractal display is slightly decayed. Use this option while you're exploring the entire fractal.

When it's disabled, the fractal rendering in the window is more precise, resulting in an image with smoother edges. However, zooming animation is more staggered.

Large Cursors

When this option is enabled, the cursor the main preview window changes to indicate the direction of the zoom.

The various large cursors.

Setting Preview Size

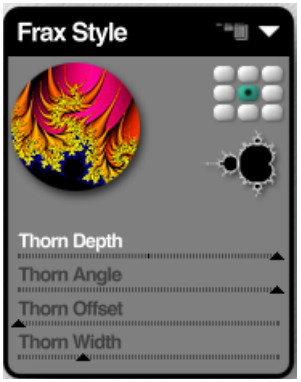
The Main Preview window can be set to three different sizes. These size settings are different from those commonly used in KPT filters. The sizes in KPT FraxPlorer are designed to let you achieve the best possible preview for your system.

KPT FraxPlorer's preview sizes are as follows:

- Small = 320 x 240 pixels
- Medium = 400 x 300 pixels
- Large = 512 x 384 pixels
- X-Large = 640 x 480 pixels

Coloring a Fractal

Fractals are colored using Coloring modes. The mode you choose can greatly alter the look and feel of your fractal. A lot of the fun of exploring fractals is seeing how the Coloring mode changes the patterns inside a fractal.



The controls on the panel change as you switch coloring modes.

Setting the Inside Color

The interior of a fractal is the dead space where no patterns exist. This area is usually colored black. However, you can create different visual effects by changing its color. You can choose a color that compliments one of the Coloring modes or pick a color that makes it easier to see the fractal's pattern. The inside color can also have transparency.

To choose an inside color:

1 In the Frax Style palette, click the small fractal icon. The Color Picker appears.

Click the icon to set a fractal's inside color.

2 Choose a color, grayscale value or transparency setting.

Refer to "Using the Color Picker" on page 29 for more on using the Color Picker.

Using a Gradient

Each of the coloring modes available in the Frax Style panel uses gradients to apply colors to a fractal. Gradients are drawn from the Gradient panel.

Refer to "Color Gradient Panel" on page 35 for more on designing gradients.

TiPS

You can quickly scroll through gradient presets using Command/Ctrl + Left and Right arrow keys.

Drag over the panel's title bar while you're selecting colors to select nothing.

Using Coloring Modes

The fractals in KPT FraxPlorer are pure mathematical objects, often in four or higher dimensions. KPT FraxPlorer displays, two-dimensional slices of these objects, which are in essence just shapes with a well-defined inside and outside.

The inside component is called the set. This region is usually shown in black. Points outside the set (but in the general vicinity) are affected by its presence, analogous to the way an airplane creates turbulence in the airflow around it.

The different Coloring modes in KPT FraxPlorer are just different representations of this turbulence effect, much as there are several ways to represent the flow of air over an airplane wing.

NoTe

For mathematical reasons, Newton-based fractals only work with the following modes: Normal, Decomposition, Mosaic, and Threads.

Also, when zooming, a special high-precision algorithm kicks in, and only the basic Potential Rendering coloring mode is supported.

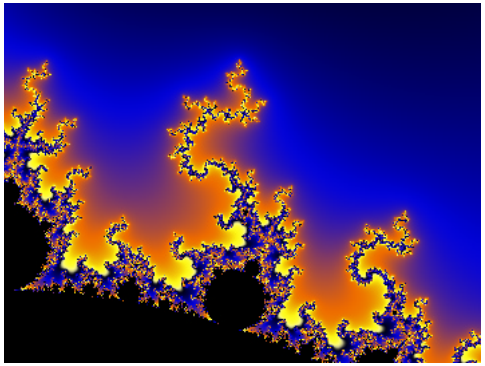
To choose a coloring mode:

- In the Fractal Style panel, click the coloring mode circle, or click the text label under the circle and choose a mode from the menu.

Potential Rendering

Potential rendering is the simplest coloring mode to compute, which is why it's become the standard for drawing fractals.

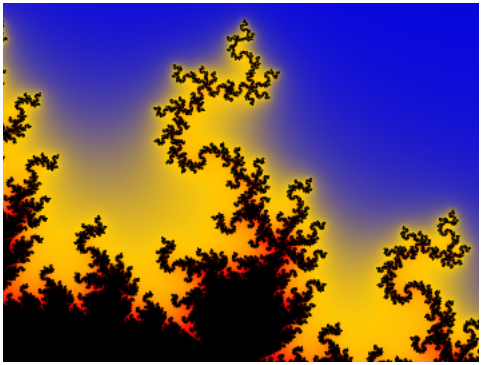
If you think of the inside of the set (black area) as being electrically charged, this coloring mode would represent the electrostatic potential of the surrounding electromagnetic field.



An example of a fractal colored using Potential Rendering.

Dendrite Rendering

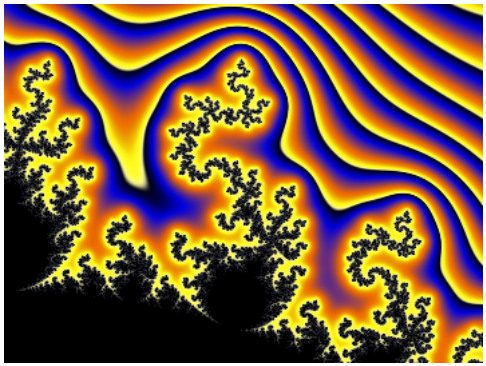
This mode uses a single pixel line to trace the edges of the fractal. It tends to bring out the detail of the fractal that may be obscured by color noise.



An example of a fractal colored using Dendrite Rendering.

Distance

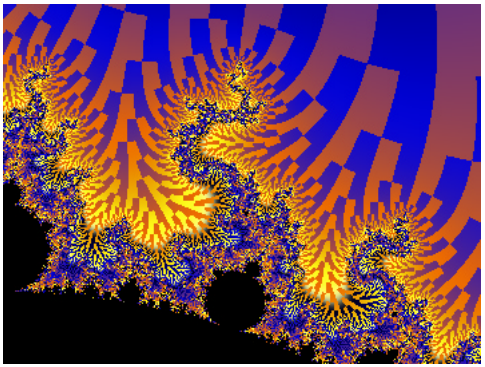
This mode uses a special algorithm to compute an approximate distance from each point to the boundary of the set. Though Distance seems similar to Potential Rendering, it can actually produce a very different visual feel, and is often less noisy than the Potential Rendering near the set. Try cranking up the gradient frequency and see what happens!



An example of a fractal colored using Distance.

Binary Decomposition

This mode exploits a computational artifact of the Potential Rendering, which splits up the outside area into separate squarish shapes. The sharp lines in these renderings define a sort of polar coordinate system for the set.



An example of a fractal colored using Binary Decomposition.

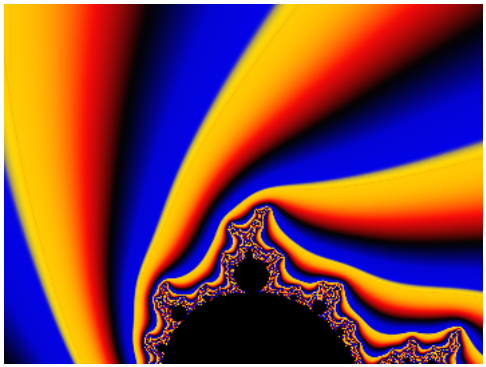
Setting Decomposition Amount

The Decomposition amount controls the difference in coloration between adjacent squares.

Twist

If you think of a map of the North Pole, with latitude lines in circles and longitude lines leading away from the pole, then the standard Potential Rendering colors the set according to latitude only (circular lines). The Twist style computes both latitude and longitude for each point, and colors the outside of the set with a combination, yielding swirly or twisty results.

This mode works best when you're zoomed out, looking at the whole set. When you zoom in too far, it ends up looking just like the Potential Rendering, though it computes slower. Switch back to the standard rendering mode for deep zooms.

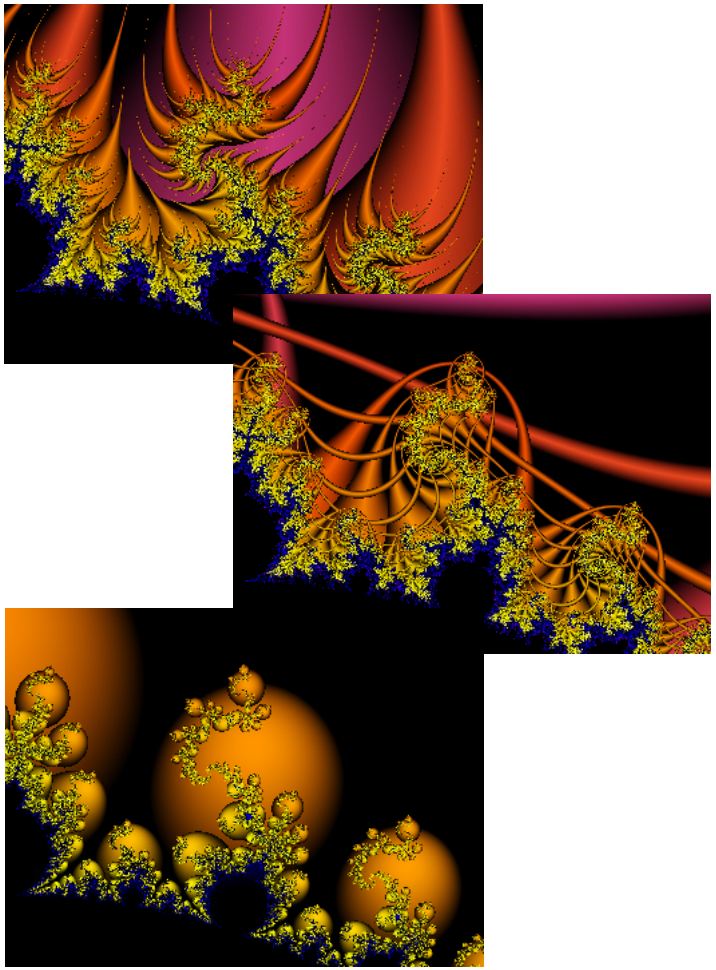


An example of a fractal colored using Twist.

Thorns, Ribbons, Bubbles

If you think of coloring modes as turbulence representation, each pixel is computed by following its trajectory until it gets to a certain safe distance away from the set. These three coloring modes operate by placing barriers in the path of the airflow, and coloring points differently depending on which barriers they hit on their way to escaping.

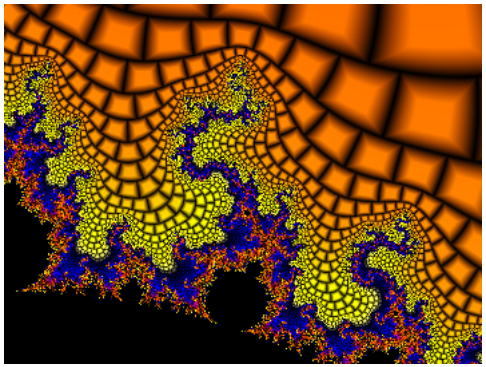
Thorns uses long lines as barriers, Ribbons uses concentric rings, and Bubbles uses spherical shapes. The sliders control various properties of these barriers, which can affect the final rendering in unexpected ways. Play around, who knows what you'll find.



An example of a fractal colored using Thorns, Ribbons, and Bubbles.

Mosaic

This mode is loosely based on the Binary Decomposition, but draws smooth pyramid shapes instead of solid-color squares.



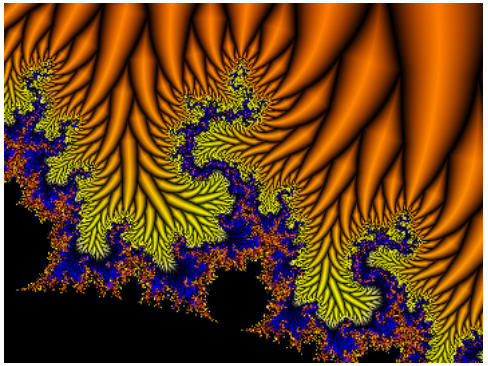
An example of a fractal colored using Mosaic.

Setting Mosaic Bevel

The Mosaic Bevel slider controls the bevel width on the edge of each pyramid.

Cilia

This mode is another Binary Decomposition spin-off. Pick a tile, and see how far you can follow it in.



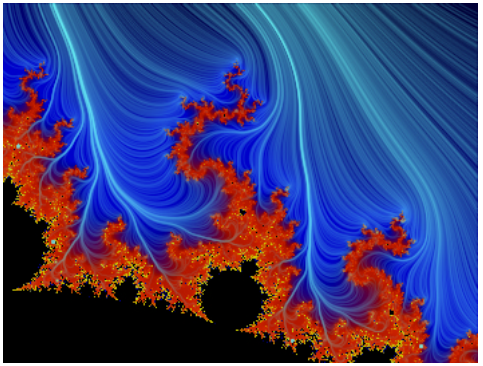
An example of a fractal colored using Cilia.

Setting Cilia Bevel Amount

The Cilia Bevel slider controls the bevel width on the edge of each tile.

Plasma Threads

This mode simulates a plasma ball effect, by tracing out the electrical paths of least resistance in the Potential rendering. This mode requires more memory than the other modes. Be sure to allocate lots of memory to the host application before you try to render really huge fractals.



An example of a fractal colored using Plasma Threads.

Setting Thread Density

The Thread Density parameter controls the number of threads that are calculated.

Setting Thread Angle

The Thread Angle parameter controls thread twistiness.

Setting Thread Color

The Color dot lets you choose a color for the threads using the Color Picker.

Rendering Your Fractal

KPT FraxPlorer has three output modes that let you control the quality of your final rendered fractal. KPT FraxPlorer uses anti-aliasing to enhance fractal elements. The three modes let you turn anti-aliasing off, apply it selectively, or apply it to all renders.

Anti-Aliasing Off

This option disables anti-aliasing.

Anti-Aliasing Adaptive

When this option is enabled, anti-aliasing is only applied when you're using one of the following coloring modes:

- Potential Rendering
- Binary Decomposition
- Twist
- Thorns
- Ribbons
- Bubbles

Applying anti-aliasing to the other modes increases rendering time.

Anti-Aliasing On Always

When this option is enabled, anti-aliasing is applied to all renders, regardless of the coloring mode selected. Adding anti-aliasing to some of the more complicated coloring modes can greatly increase rendering time.

Previewing Output

You can preview your final output in one of two ways:

- By viewing it in a small window using the Preview Apply option
- By viewing at full screen size using the Preview Full Screen option

When you select the Preview Apply option, KPT FraxPlorer renders a version of your final fractal, with anti-aliasing, and displays it in a window. Rendering your fractal at full screen size also applies anti-aliasing.