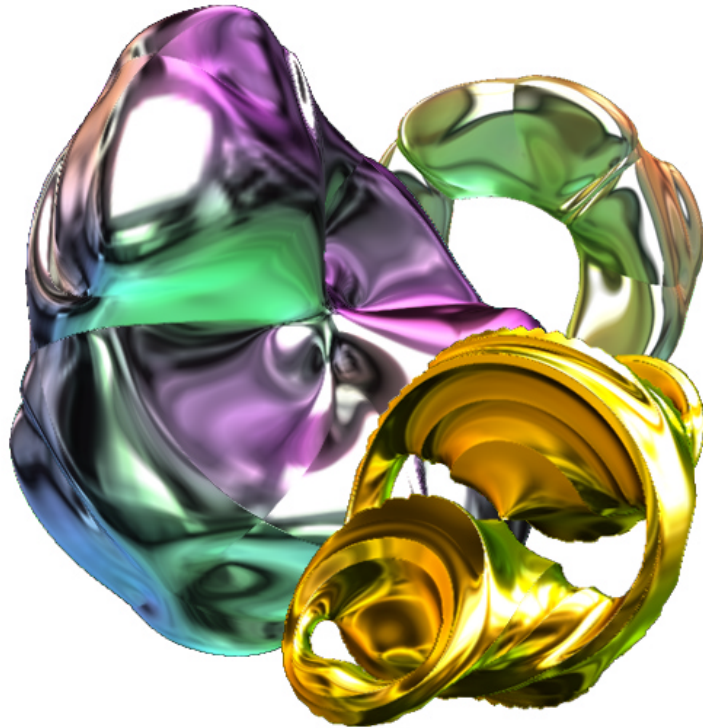


KPT FRAX4D



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Overview

KPT Frax4D is a beautiful new way to look at fractals. It creates 3D sculptures out of fractal space at the click of a mouse. These sculptures can then be wrapped with any environment map. In other words, you can make 3D fractal sculptures out of gold, silver, green gel, or whatever you come up with.

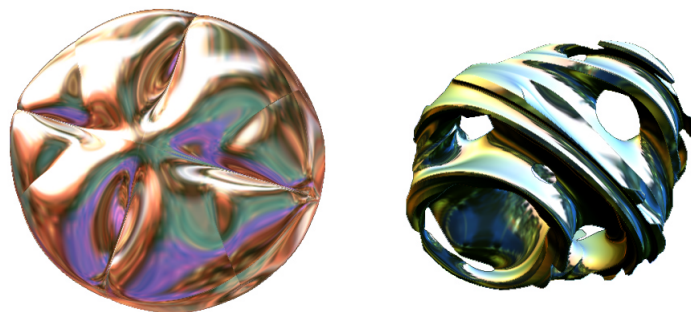
Creating a KPT Frax4D Object

KPT Frax4D lets you create a 3D object by choosing a number of parameters or dragging in the Frax4D preview windows. As you change these parameters, you're actually exploring fractal space encountering different fractal patterns as you go. The fractals you find are displayed in the Main Preview window. Once you have a fractal you like, you can rotate it, add an environment map to it, and finally, render it as an image.

4D vs. 3D Fractals

KPT Frax4D has two modes. The first mode, called Cogiternion, lets you explore 3D fractal space by combining three parameters.

The other mode, called Quaternion, lets you explore 4D fractal space. The point you're exploring is defined by setting four parameters. The final 3D object is created by taking a 3D slice of a 4D fractal.

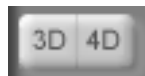


Examples of 3D and 4D fractals.

The number of parameters available in the Control panel depends on the type of fractal you're creating.

To switch modes:

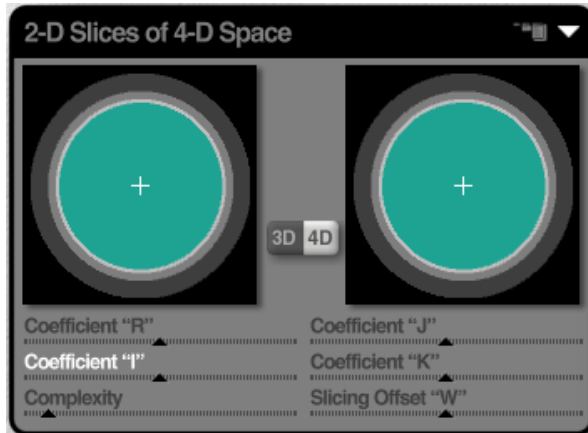
- ✱ Click the 3D/4D toggle button in the center of the 2D Slice of 4D Space panel.



Click the 3D/4D toggle button to switch between 4D and 3D fractals.

Using the 2D Slice of 4D Space Panel

The 2D Slice of 4D Space panel lets you view your fractal by taking slices of it and displaying them in 2D previews. Basically, what you're seeing is the inside of the object. The sliders on the panel let you adjust the coordinates of the fractal slices.



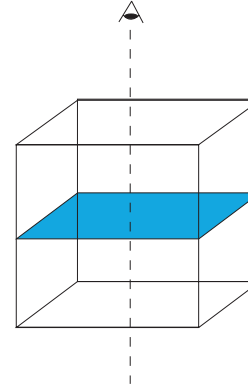
The 2D Slice of 4D Space panel.

You can also explore the fractal by dragging inside the panel's preview windows. As you drag, you're adjusting two parameters at once.

The number of controls available depends on the type of fractal you're creating. For a 3D fractal, you'll have R, I, and J controls. For a 4D fractal, you'll have R, I, J, and K controls, plus a W slice control.

Choosing R and I Parameters

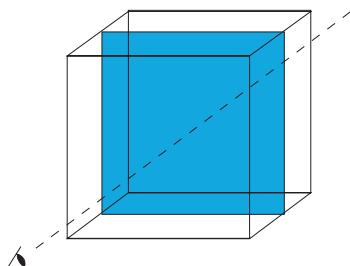
The R and I Coefficient controls let you set the position of the R and I slice of your fractal. The R I slice is a roughly horizontal plane cutting through 3D or 4D space. As you adjust the coefficients, the preview shows you a horizontal slice of the fractal object you're exploring.



A graphic representation of the R I preview.

Choosing J and K parameters

The J and K Slice Coordinate sliders control the position of the J K slice. This plane is roughly vertical. As you change the position, the preview shows you a vertical slice of the fractal object.

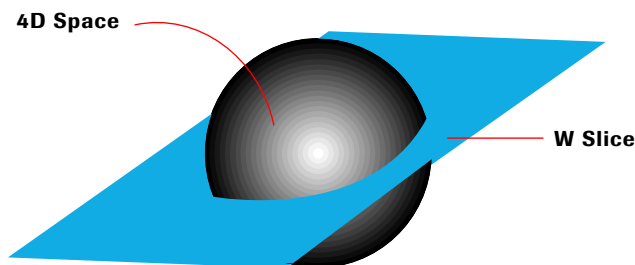


A graphic representation of the J K preview.

Viewing your Fractal using a W Slice

Since you can't actually display a four dimensional fractal on a computer, 4D fractals are sliced along their origin, either horizontally or vertically, to produce a three-dimensional object that you can see on screen. The Slicing Offset W slider controls how the slice is taken from the 4D fractal.

This control is only available when you're working with a 4D fractal.



A graphic representation of the W slice.

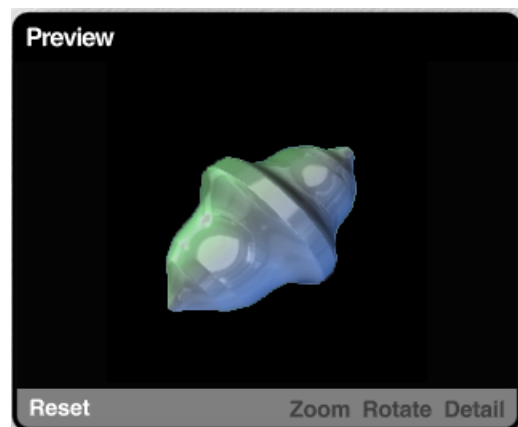
Setting Fractal Complexity

Fractals in KPT Frax4D are actually volume renders. As the filter renders, it moves through 3D space, rendering your fractal as it goes. The Complexity parameter tells the filter how many steps to take for a render. The more steps the filter takes, the more detail it will encounter, which in turn results in a higher quality object.

If you find that your fractal has some unwanted noise in it, increase the Complexity value.

Exploring your 4D Fractal

Once you have a fractal you're happy with, you can explore its patterns to see if there are any areas of the fractal you want to render as the final image.



The KPT Frax4D Main Preview window.

Zooming into a Fractal

Like other fractals, a 4D fractal is infinitely detailed. The Zoom control lets you enlarge a portion of your fractal so you can see more detail.

Viewing a Fractal in the Main Preview window

The Main Preview window lets you rotate your rendered sculpture by dragging it in any direction.

The Reset control lets you clear all the rotations you've applied to the fractal so that it appears in its default position.

Setting Fractal Iterations

The Detail control sets the sharpness of the fractal. Lower values produce smoother-edged fractals. Higher values produce more jaggy-edged fractals. As well, the higher the detail value, the longer the fractal takes to render.

Adding an Environment Map

An environment map is an image that is projected onto your fractal to create reflections. It can be used to simulate different surfaces like gold or silver. The map is controlled using the Environment panel.

Refer to ["Environment Panel" on page 34](#) for instructions on loading environment maps.

Setting Up Lighting

KPT Frax4D sculptures are three-dimensional objects, which means that you can light them from any angle. The 3D Lighting panel contains all the controls you'll need to set light color and angles. Refer to ["3D Lighting Panel" on page 30](#) for more on using the panel.

Rendering your Fractal

Depending on whether you're working with a 3D or 4D fractal, you can change the render quality of the fractal before you turn it into an image.

4D fractals can be rendered using the High Quality option which uses enhanced raytracing to produce a cleaner image.

To choose a render mode:

- ⌘ Click the option arrow at the top of the 2D Slice of 4D Space panel and choose either Quaternion: Normal or Quaternion: High Quality from the menu.

Extremely Technical Notes

The general description provided earlier in this chapter explains how KPT Frax4D works in laymen's terms. What follows is a more technically accurate description. Be fore-warned, the paragraphs that follow provide information that won't really enhance your use of the filter, but it may give you a mild headache.

KPT Frax4D lets you choose parameters that define a point in 4D space. What you're seeing in the preview windows is the fractal that exists at that point. As you change parameters, you're exploring either 3D or 4D space locating either more of the same fractal, or completely new fractals.

When you're working with a 3D fractal, you're defining a point in 3D space using R, I, and J parameters, which result in a 3D object.

When you're working with a 4D fractal, you're defining a point in 4D space using R, I, J and K. The W slice parameter is then used to fix the L parameter. This results in a R, I and J object which can then be converted into a 3D object you can work with.