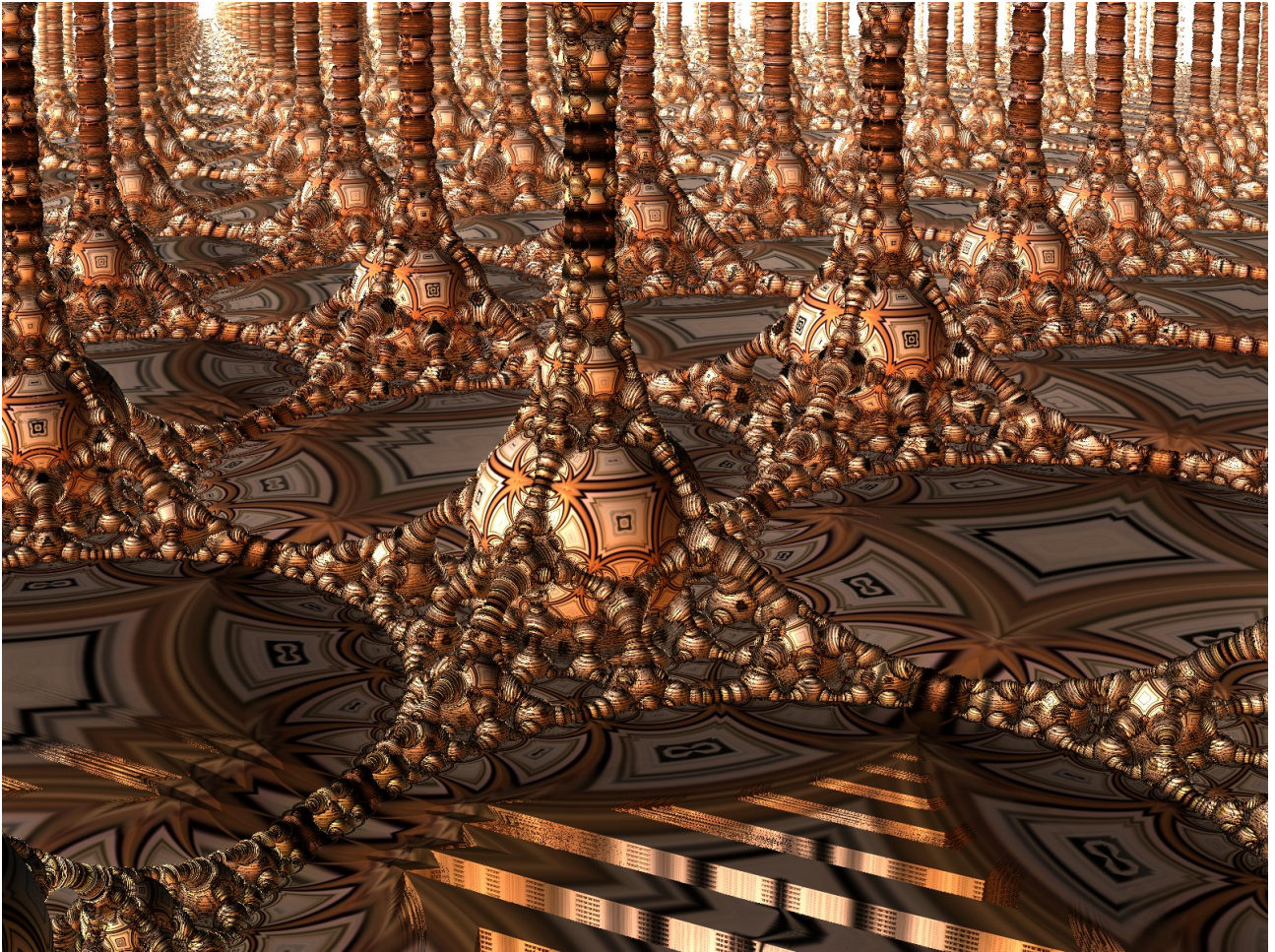


MANDELBULB 3D
Summarized Tutorials
from
:iconsiriusstarsage:



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Tutorial from

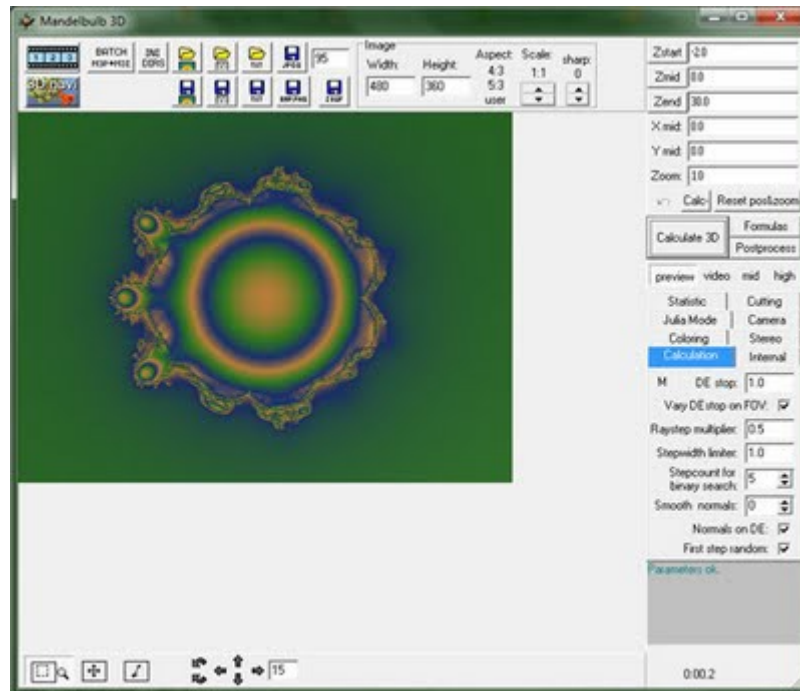
Jody Vaughn Lawrence

siriusstarsage on DevArt.

Mandelbulb 3D Tutorial: The Basics

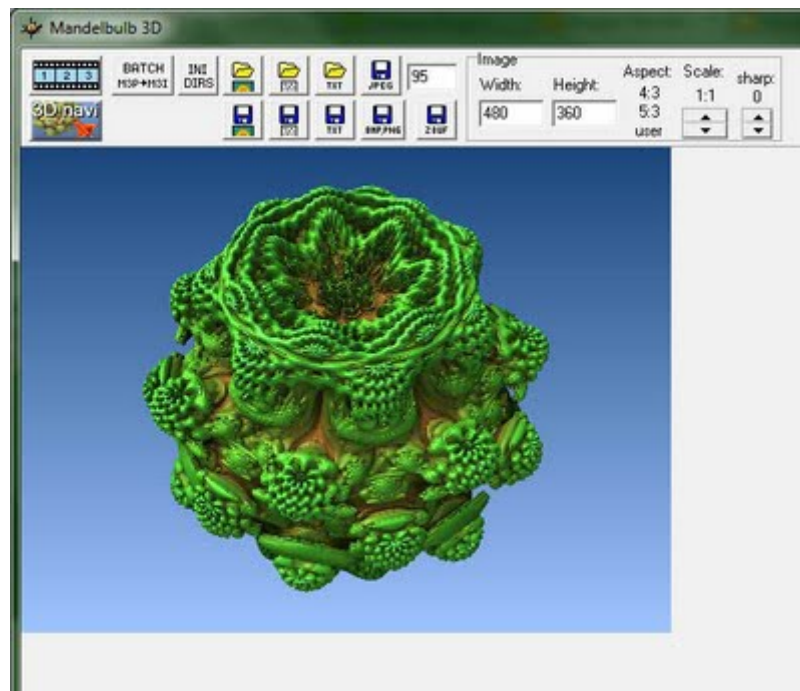
Alrighty! Finally decided to get down and start documenting all I've learnt so far about Mandelbulb 3D, a wonderful program for rendering 3D fractals.

First thing to say is, don't get intimidated by all the very technical math terms found when you open the program! You don't need to worry about most of it for now. (Though most of them, if you hover the mouse over them, will have a little description as to what they do in practical terms). Just follow my lead. So this is what the program looks like upon first opening it:



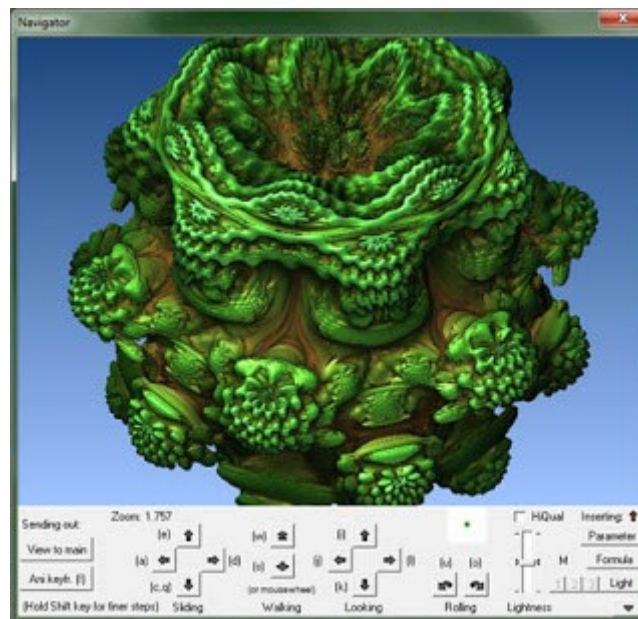
Also, two other windows open up with this one, called Formulas and Lighting, which I'll get to later.

The first thing I'm sure your eyes fix upon is that big juicy looking button called "Calculate 3D" ... Go ahead and click on it ;D ... Here is what you should see after a quick rendering:



The Mandelbulb

Yes, it is the famous Mandelbulb. Now if you're like me, you probably went ahead and tried the zoom button in the bottom left corner. This is fine, but what happens is, it jumps back to 2D and you have to click on Calculate 3D again. A much better option is the "3D Navi" button you see there on the top-left. It will open up a new window that looks like this:



Mandelbulb in the 3D Navigator

From here, you can explore the bulb further. Notice the different buttons at the bottom there... Now, I don't quite understand all of how everything works yet, but I'll try and explain as much as I know:

- The two "rolling" buttons are self explanatory. They roll the image either clockwise or counter-clockwise. You can set the amount of degrees it will roll if you click on that little down arrow in the bottom right corner. (It opens up more settings):

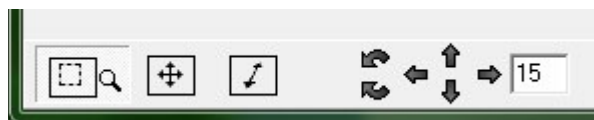


Navigation controls and settings

- The 4 "looking" buttons are exactly that: If you click once to the right, for example, it's as if you're turning your head a little to the right and looking in that direction. Same with left, up and down. To what degree you turn your head is also determined by the "Looking+Rolling angle" in the bottom settings.
- Then there are the two walking buttons, which is the default function of using the mousewheel. By default, using them zooms in closer to or further from the fractal (getting closer reveals more detail). But if you have "Fixed zoom and steps" ticked (also in the box that pops down when clicking on the bottom right arrow), then you simply *move* closer to it. Like this, if you get too close, you start walking through the fractal. Try yourself to see what I mean.

I have problems though, with these two little buttons... Especially when using the mouse wheel, where zooming in changes many more parameters than the zoom. Sometimes its behaviour is unexpected and most of the time I can't figure out why. The best thing to do when you get lost in a zoom, with lots of sky and pixelation, is to click on the Parameter button. This will load the original settings, which should bring you back to the full-size bulb.

- Then, the 4 "Sliding" buttons: The best I can do to explain these for now is to say that it's like you're side-stepping and turning a little, in whichever direction you click. You'll notice that the zoom is affected when clicking on them. For me, the best thing about them is using them with the Looking buttons, to rotate the fractal and "look around corners".



*** A note: There are these navigation tools in the main window that can be useful (if a bit cumbersome) especially when first loading your fractal and inspecting it for the first time:

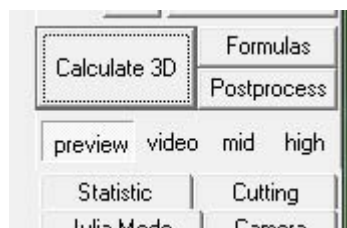
As I mentioned in the beginning, you can zoom in here, but it switches to 2D so you need to re-"Calculate 3D" each time. The same thing with the move tool. And the arrows are for rotating the 'bulb in any direction by the number of degrees you specify.

Ok so, now zoom in to an area you like, get used to the other navigation keys, and once you've found a good spot, stop there. I did exactly that:

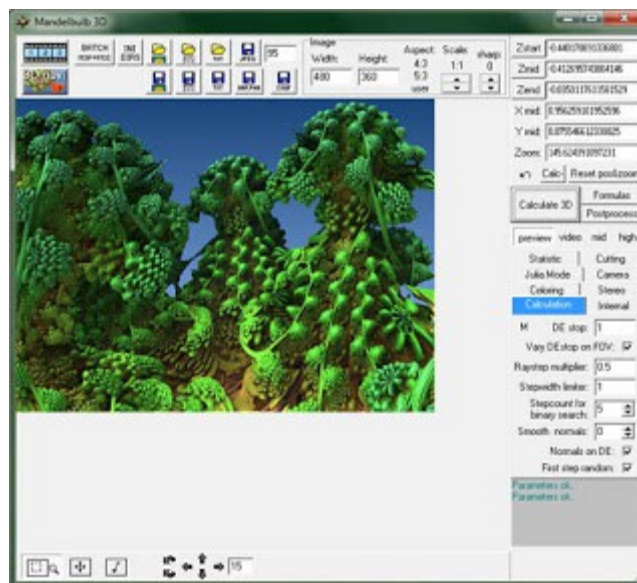


A nice foresty zoom-in of the Mandelbulb

Ok, I'll get to colouring and lighting in the next blogpost. For now though, let's just save your fractal for future access. The first thing you need to do is click on the "View to main" button, in the top left corner. Then you go back to your the main window, make sure you have "Preview" chosen, and click on "Calculate 3D":

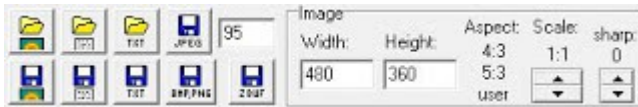


And your image will be rendered quite quickly in the main window:



Foresty area rendered in the main Window

So now that it's rendered, you can start changing it's look by using the Lighting window. As I said, that's for my next post. For now, let's save your fractal for future retrieval. You have 4 different saving options:



Saving Options

- **As an m3i:** This is Mandelbulb's file format. Loading this will load your fractal exactly as you left it. Note though, that if you save your fractal in this format, the file can be big. My one above was only 1.3mb or so, but if you render it on "High" instead of "Preview", expect the file to be much bigger. Over 100mb is normal. See saving as m3p below.
- **As an m3p:** This is a parameter file. To my knowledge, it is exactly the same as an m3i, but way smaller. It saves only the necessary information needed to render the fractal again. When you load it, you have to click on "Calculate 3D" to get your fractal back. I recommend you do this now. If you like, save your fractal in both m3p and m3i and then go compare the two file sizes.
- **As copy/pastable parameters:** Very useful if you'd like to share a particularly interesting discovery with fellow 'bulbers. You simply click on the 'txt' button with blue disk on it and then paste wherever you like. And the other way around too. If you find parameters posted by someone, you simply copy them (starting from "Mandelbulb3Dv17{P.....S....O/...ET...2....." etc, until the closing "}" bracket) and then click on the 'txt' button with the yellow folder on it.
- **As an image:** You can choose bmp, png or jpg. Use this only once you're 100% happy with how your fractal looks.

Ok, that's it for now! I'll do the next one soon, about Colouring and Lighting. But don't let that stop you from experimenting by yourself :)

If my tutorial is helping you, please consider buying something from my [DeviantArt gallery](#). Photo-prints, Canvas prints, puzzles, mousepads and even mugs are available => ...

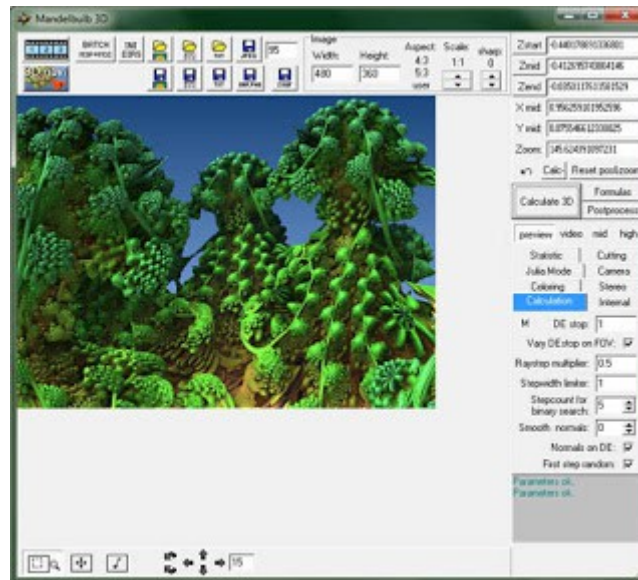
Mandelbulb 3D Tutorial: Lighting and Colouring

To continue...! Once again, let me state that I've only just started with Mandelbulb 3D and thus my knowledge is still in it's nascent stage. I'm doing this tutorial at this stage deliberately, so that all you guys who need it feel that I'm on more or less the same level as you: I know nothing to nearly nothing :P

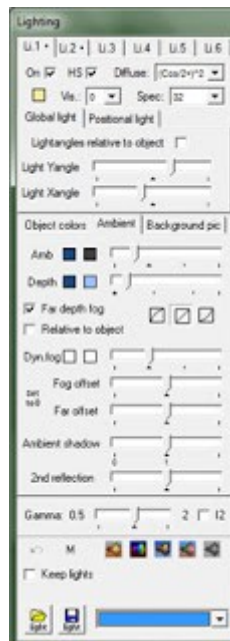
Ok, on we go. To start, you need to open up your .m3i or .m3p that you saved last time ([see previous tutorial page](#)).

If opening an .m3p, remember to click on "Calculate 3D" to render your image once again.

If you remember, this is the image I am working with:

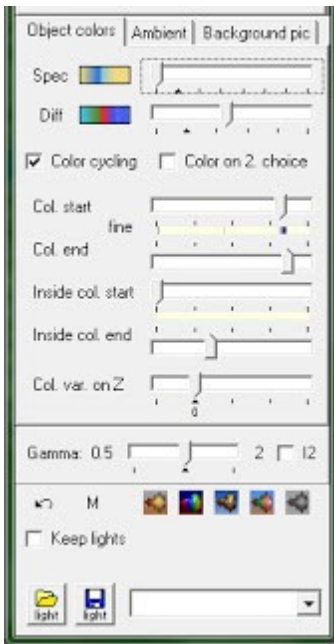


Now you need to go to the Lighting window, which should have opened up when you opened Mandelbulb 3D:



There it is. The first thing you should notice is those little Li 1, Li 2, Li 3, etc, tabs right at the top. Each one can be turned on or off with that little check-box just below "Li 1" ... Each Lighting tab can be either global or positional, and you can change the colour of the light with the little button just below the on/off check-box.

Generally though, I leave lighting for after I've played around with the colours of the actual fractal. For this, you need the second section that you can see there, with the "Object colours", "Ambient" and "Background pic" tabs.

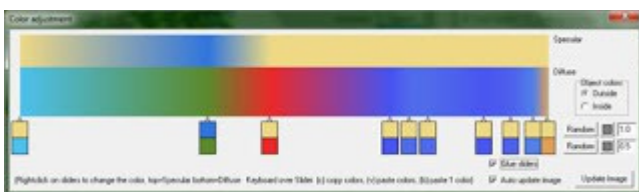


Leave "Ambient" as is for now and click on "Object colours":

As you can see here, mine already looks different to what yours looks like. I've already changed the "Diff" (diffuse) colours a bit (by clicking on the coloured button), to give my foresty area a better look. After playing around a little with the random button (always fun :)), I tried to get to a more natural green colour, and gave the trees red fruit (not recommended for eating!). Also layered some blues on the ground to give a feeling like the trees are growing from a watery source. I also shifted the diffuse colour bar a bit to the right, making the whole scene lighter, and the "spec" (specular) colour bar all the way to the left, because that gave it a much preferred smoother look. Basically, it seems like these bars increase or decrease the intensity of your chosen colours.

Changing specular colours, btw, might not always produce obvious changes, but can still affect your image very nicely, giving a little more of a depth feeling to it. To experiment with it, it can be useful to load the gray colour preset found in the bottom right corner, much like Don Whitaker does in his [Video Tutorial here](#).

Something else: You can deselect the "Bar slider" option in the colour gradient window, so that you can move each colour point independently.



All in all a much more vibrant feel, wouldn't you say? :) :

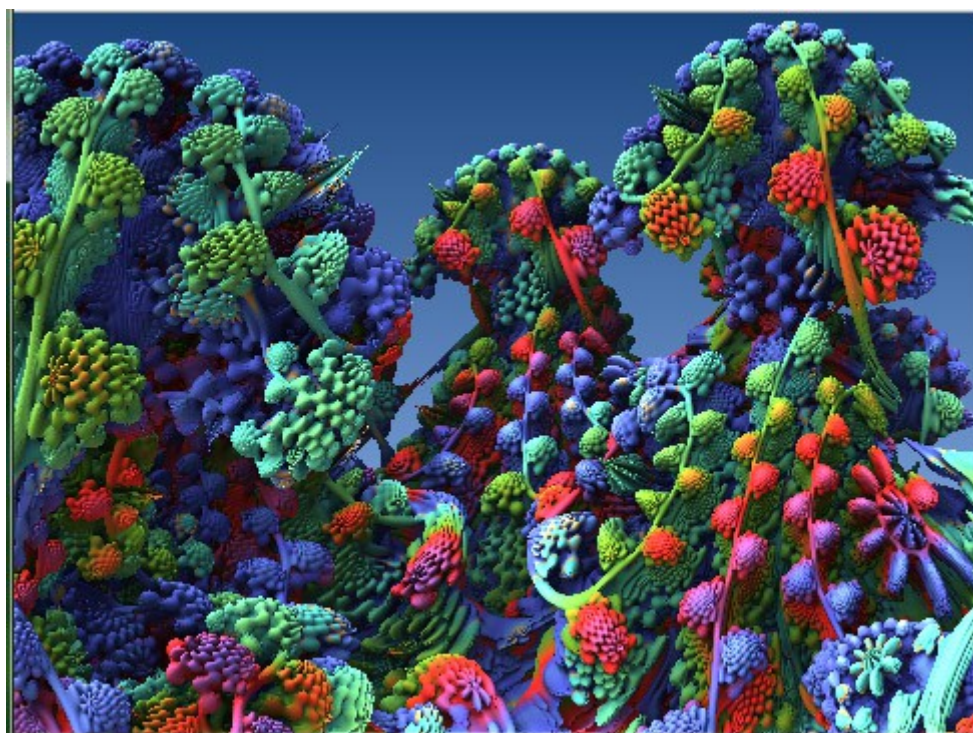


Poisonous Fruit Mandelbulb Forest

So now you play around with the colours in your chosen area, until you have something you like. Next, we play around with the different little buttons and sliders :) ... I tried sliding the 4 "col. start" and "col. end" sliders, but the results weren't very exciting. Of course, I don't quite understand what's going on yet :P and perhaps with other fractal formulas and/or colour set-ups, depending on the area you're focusing on, this might work differently. Experiment with your own pic to see.

The "color on 2. choice" checkbox, when checked, it seems, simply inverts the colours.

But a much more interesting variation in colour happens when you slide the "Col. var. on Z" bar. Going all the way to the right with it, I got a much more psychedelic, fruity-tooty forest:



Fruity-Tooty Mandelbulb Forest

(Actually, this is what you start seeing if you are in that Mandelbulb world and eat one of the poisonous fruits...)

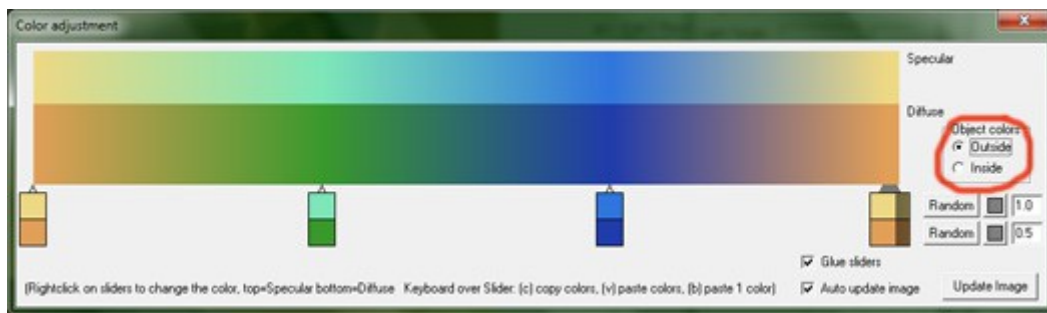
Below the "Col. var. on Z" sliding bar is a Gamma sliding bar, which is self-explanatory, though if not to you, just try it. Nothing major, just darkens or brightens things up a bit.

Below that is a handy undo button (if you right-click it, it's redo), and right at the bottom, if you particularly like a colour setting for some reason, or want to keep it for a set of themed artpieces, you can save it :) Thanks for thinking of everything Jesse.

Next up, the Ambient tab, and Lighting tabs... :)

If my tutorial is helping you, please consider buying something from my [DeviantArt gallery](#). Photo-prints, Canvas prints, puzzles, mousepads and even mugs are available => ...

PS If you're wondering how to change the colour the innards of your fractals (especially if you've cut your fractal up as explained on the tutorial page [Cutting!](#)), here's how... Open the normal colour editor:



Look at where I've circled. You simply select Inside, and you'll be able to change the inner colours. :)

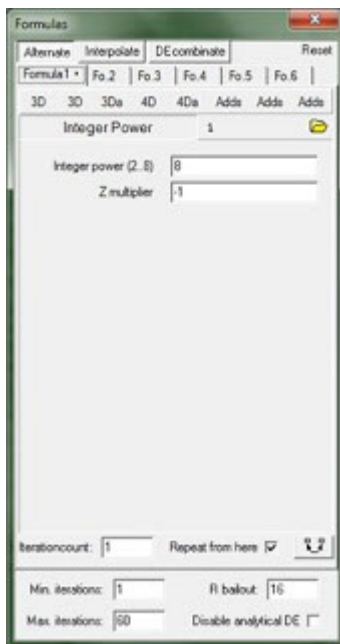
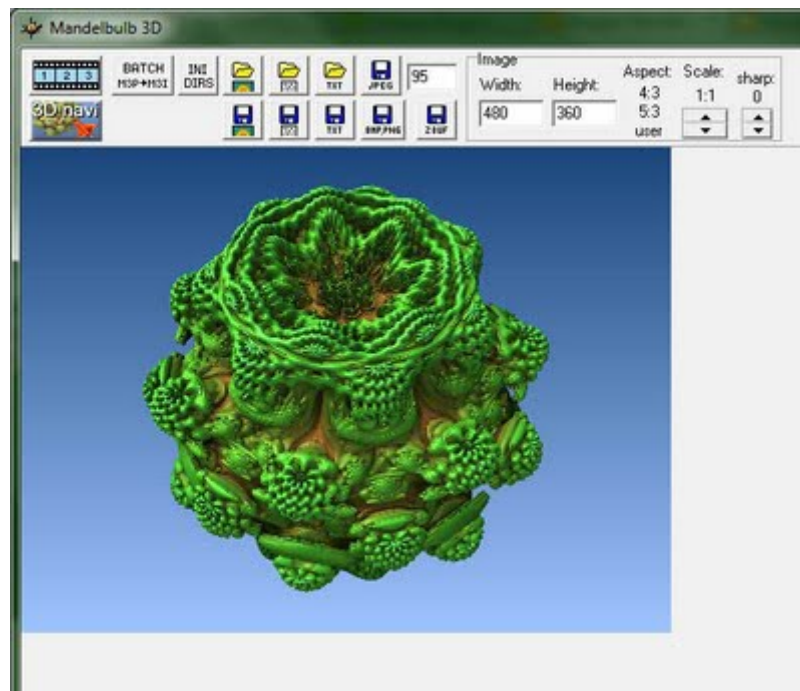
Bib993 (DA) Teli at style box - Grafik

Tuto from Jody Lawrence

Mandelbulb 3D Tutorial: Different 3D Fractal Formulas and Hybrids

... or "formulae", to be truly correct ;)

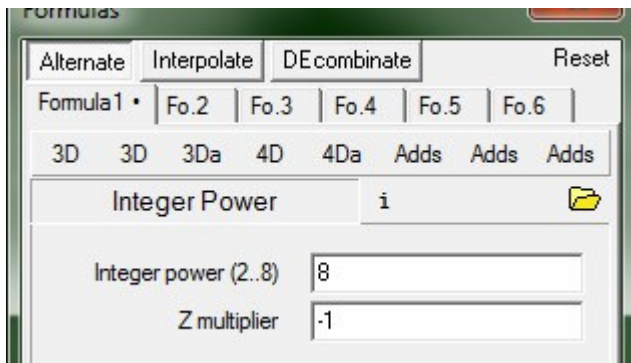
Up until now, you've been working with the formula that loads on default when you open Mandelbulb 3D, that is to say, the original one:



Formula Tab Window

But just like 2D fractals, the possibilities in the 3D realm are also infinite.

The challenge is to find formulae that are aesthetically pleasing as well. Of course, actually coming up with mathematical formulae is beyond me (for now, I tell you!). Lucky for us, Jesse built in a Formulae tab in which he has programmed many, many different formulae, from different sources:

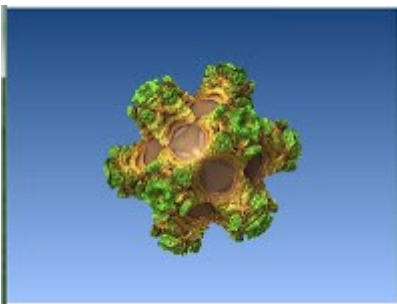


As you can see, you can use up to 6 formulae.

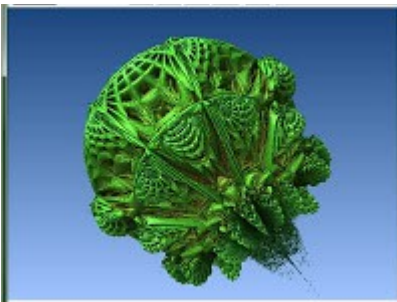
What this means is that you can combine different mathematical formulae to create a new, unique 3D fractal. But before I get to that, let me show you a few examples of single formulas.

As is visible above, the default formula that loads for the default 3D Mandelbulb is "Integer Power". Notice that there is a little black dot inside the "Formula 1" tab. This means that it is active..

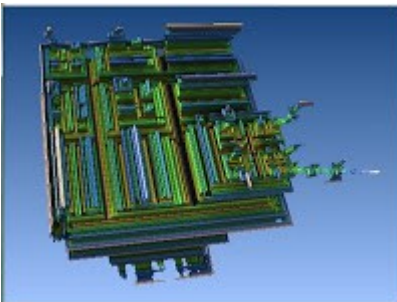
To choose a new formula, you simply drag the mouse over one of the buttons (3D, 3Da, 4D, 4Da or one of the adds) and choose an option. Note that any formula name that begins with an underscore (eg. *_ptree_tess*) is an *add-on only*, and won't do anything if you load it by itself. They are meant only as modifiers to actual formulas. Ok, here are a few examples of interesting looking formulae (in some cases I rotated them to show them off better, click to enlarge):



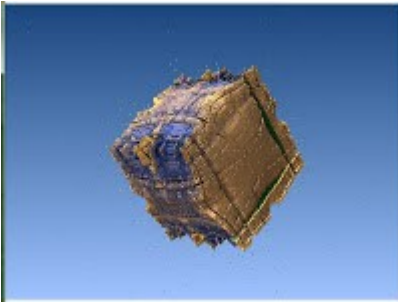
Beth1522



Riemann



GeneralQuat



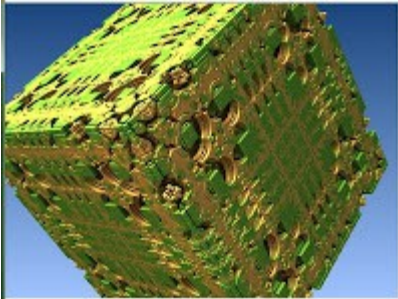
MagVsXYZabs3



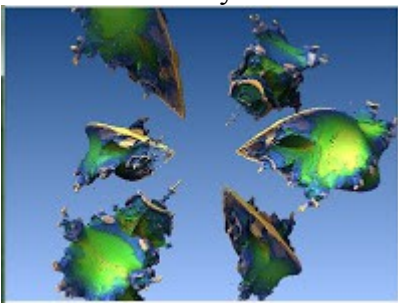
Ikenagabulb



benesi1pow2



ABoxVaryScale

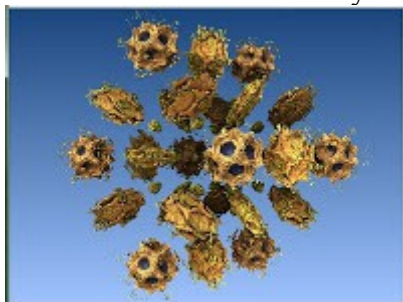


Aexion1

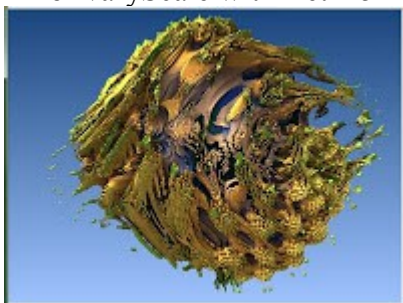
There are of course many more. But these are just the beginning, for several reasons: First, as I've already said, you can make a hybrid fractal using two or more of these formulae. To do this, just go to the next Formula tab in line (eg. "Fo.2") and choose a different one, and then click on "Calculate 3D" to see what you get. In some cases you may have to zoom in or out. Here are some examples of hybridising formulae:



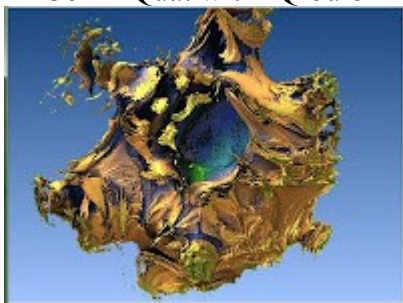
Mandelbulb with ABoxVaryScale



ABoxVaryScale with Beth1522

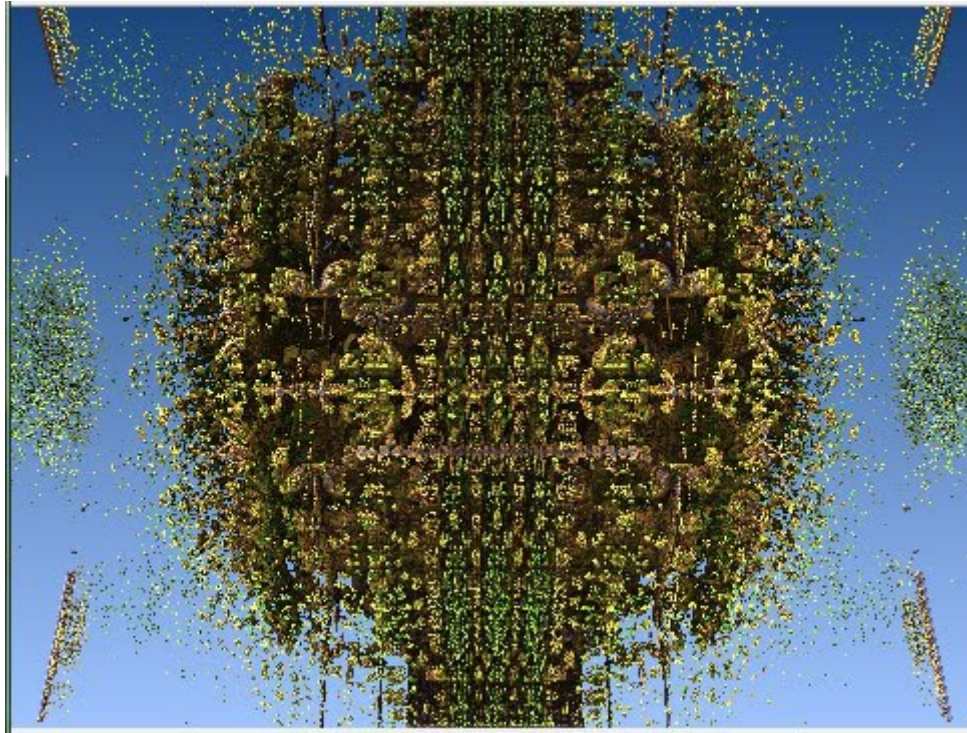


CommQuat with IQ-bulb



Beth1522 with CommQuat

The thing to remember is, just because you get a pixelated noisy mess when first trying a hybrid does not mean that it is worthless. Explore it a bit ;) ... Some really are just noise everywhere, but with some, if you play around in the navigation window, treasure mines of beautiful 3D fractals can be found. One such example, I have found, is combining "Bulbox" with the add-on "_AmazingBox" .. This is what you get:



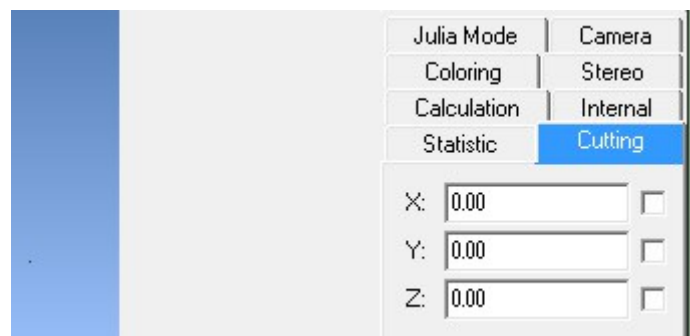
But from here, I zoomed in. And I found what I call, 35th Century Earth ;) ... Apologies for the time it's taken to get to this Tut page. Lots happening in my life right now.

If my tutorial is helping you, please consider buying something from my [DeviantArt gallery](#). Photo-prints, Canvas prints, puzzles, mousepads and even mugs are available => ...

Go to the next Tutorial page - [Mandelbulb 3D Tutorial: Cutting](#)

Mandelbulb 3D Tutorial: Cutting!

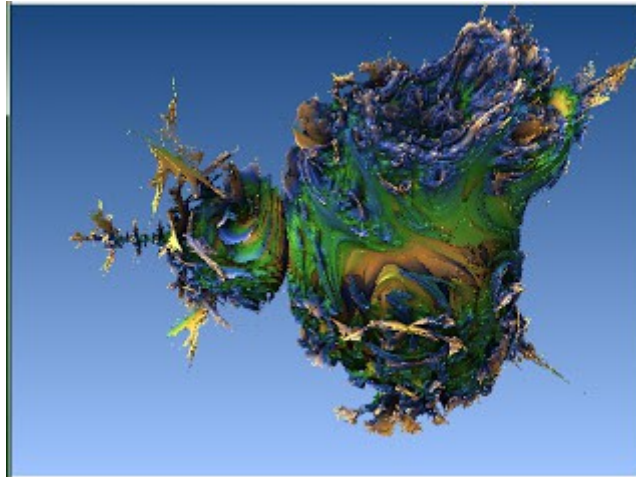
While playing around today on M3D, on a whim I decided to click on the Cutting tab in the Render window, just to have a look. 'Turns out, cutting can be a whole lot of fun :)



The Cutting Tab

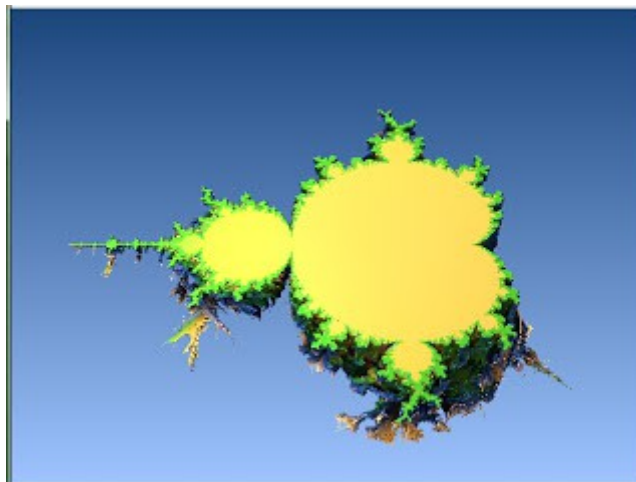
To best demonstrate this great little tool, I'm going to use the same formula that loads on default when opening the program, except, I'm going to change the power and make it 2 instead of 8. Now many of you may have already loaded this formula with this little change, since the original 2D Mandelbrot set uses the 2nd power. And many of you would have gone, "Hmm, but that looks nothing even near the amazing Mandelbrot set!" ... Well, if you slice that weird looking thing using the cutting tool, you'll see something more familiar ;)

Allow me to demonstrate. Here is the very strange looking 3D version of the Mandelbrot set:



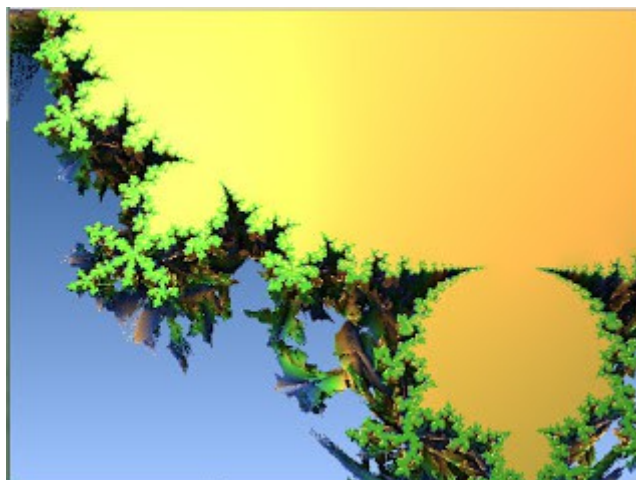
3D Mandelbrot Set

Next, I simply clicked on the z-axis checkbox (See image above), left the value as 0.00, and clicked Calculate 3D ... :

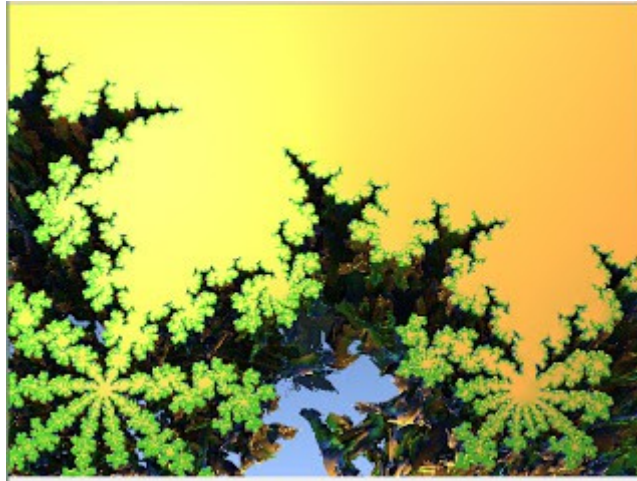


3D Mandelbrot Set cut along z Axis at 0.00

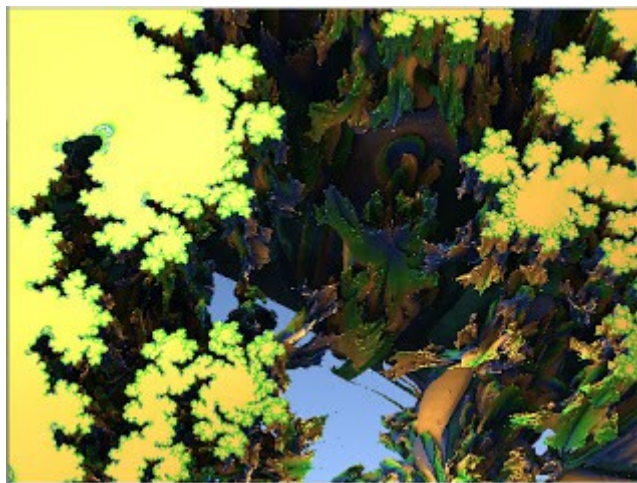
:) ... Remember this? Isn't it beautiful? Now, the nice thing about this is that, you can zoom into those little nooks and crannies, some of which are not really reachable when you're trying to navigate the entire 3D fractal in it's full bulk. Here, let me show you...:



Zoom-in 01

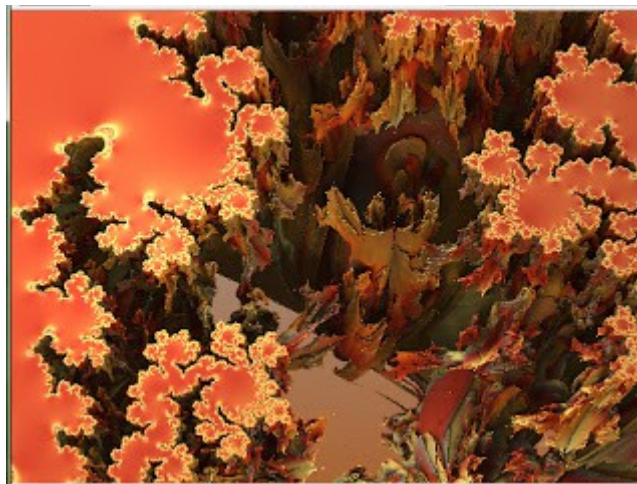


Zoom-in 02



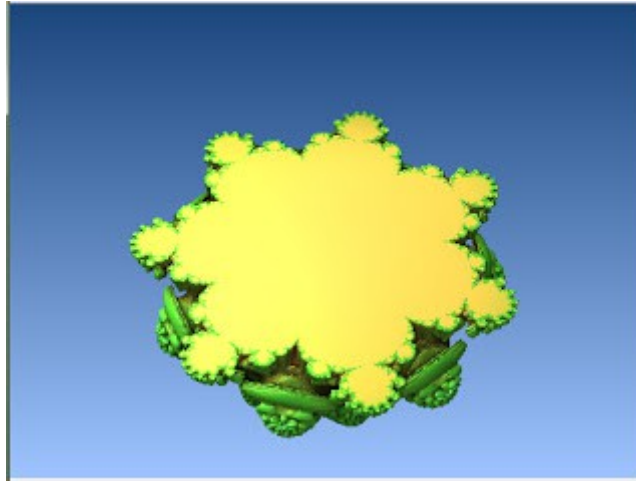
Zoom-in 03

Nice :) Now let me change the colouring a bit so we can better see what's going on in there:



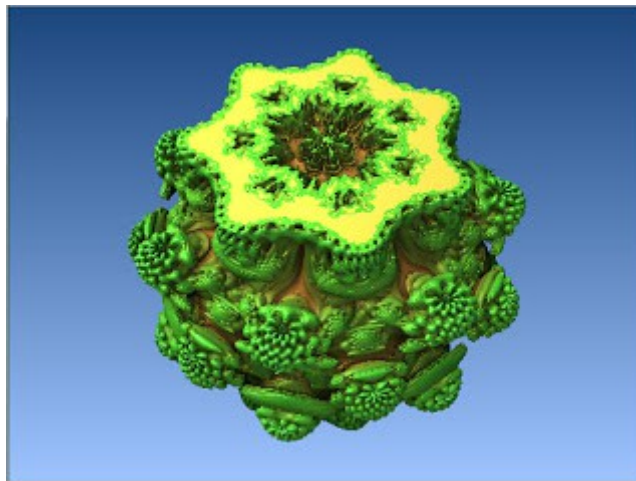
Well, it's only a little better, but you get the idea :) ... From here you can choose a spot, zoom in, zoom back out again, choose a different spot and try again, etc... With different formulas even the most experienced 3D fractalnavts would be able to find new and interesting areas had they never used cutting before.

Ok, now I'll load the original Mandelbulb (power 8) to demonstrate further. Here she is, cut in exactly the same way as above:

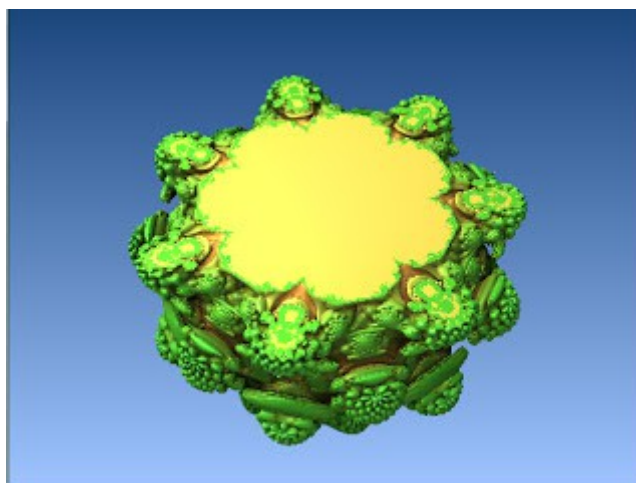


Mandelbulb cut along Z-axis at 0.00

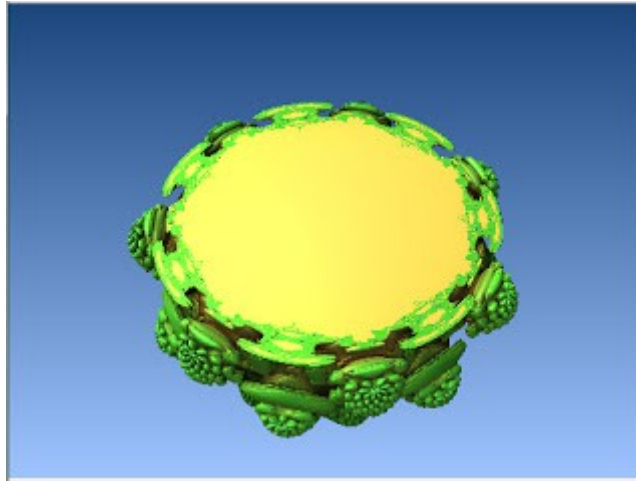
Now, what happens if we change the value "0.00" ? It gets cut through either higher or lower, depending on, of course, whether you put in a positive or negative value. Here is a series of screenshots to demonstrate:



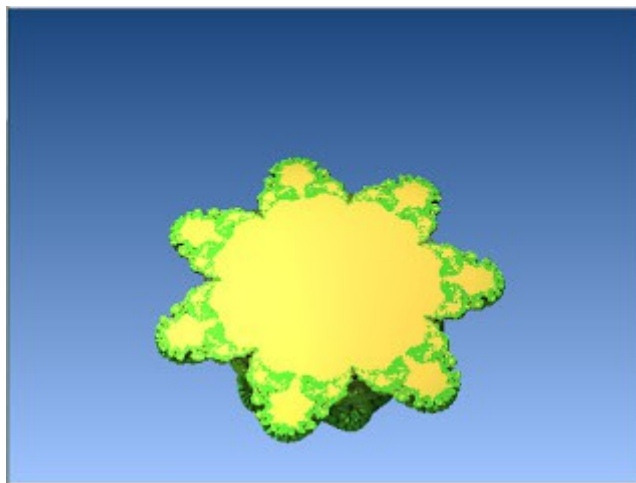
Mandelbulb cut along Z-axis at -0.8



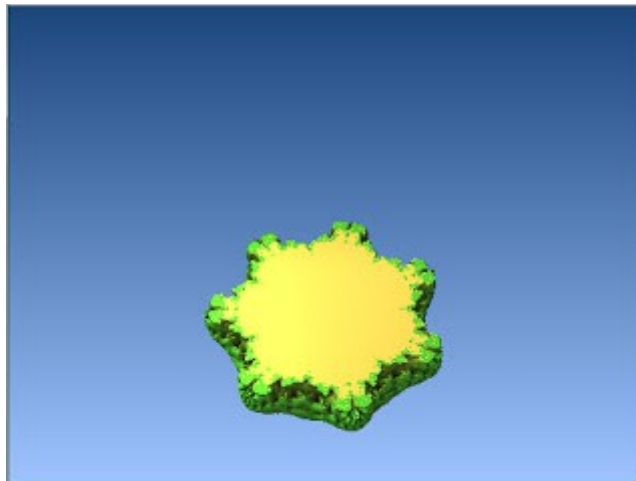
Mandelbulb cut along Z-axis at -0.4



Mandelbulb cut along Z-axis at -0.2

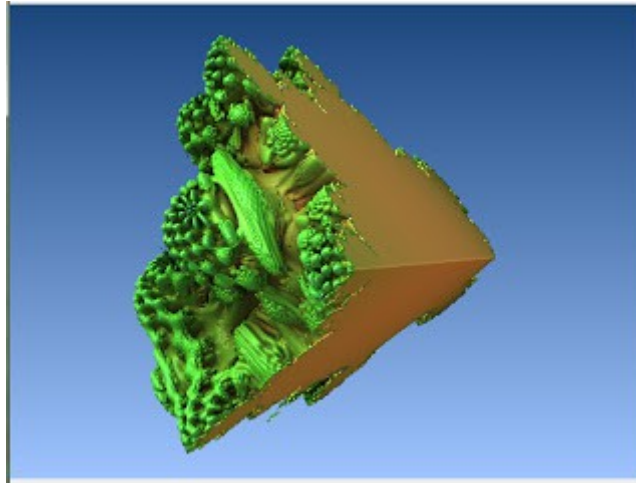


Mandelbulb cut along Z-axis at 0.3



Mandelbulb cut along Z-axis at 0.6

So it follows that the same thing can be done with the x and y axis. And you can turn any/all of them on at the same time. Here I cut the Mandelbulb along the z and y axis, both at 0.00 (with a bit of rotation for a better view):



And that concludes my 5th Tutorial page about the wonderful Mandelbulb 3D program. Thanks for watching! :)

If my tutorial is helping you, please consider buying something from my [DeviantArt gallery](#). Photo-prints, Canvas prints, puzzles, mousepads and even mugs are available => ...

Mandelbulb 3D Tutorial: Render Quality (those damn pixels!)

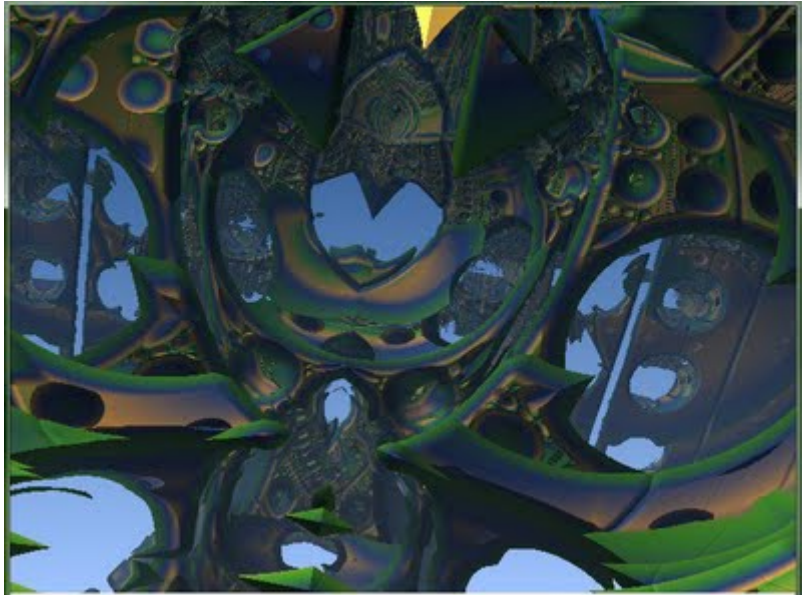
Alrighty! I'm slowing down with my posts and to all who missed me, my apologies! ... I've had this Mandelbulb 3D tutorial in my head so I forgot a little that this is a blog and I can (and should) post about anything, in between tutorial pages :)

So I'll do that - but for now, I'm going to share with you my discovery of how to improve the state of your fractal if it's full of annoying little noisy pixels. As an example, I zoomed into an appropriate area using the *Amazing Box* formula, with lots of pixelation happening along the edges and in various spots, etc.

Now before I start, let me tell you this: The better you want your image to look like, the longer it will take to render. As I'm sure you already know, when you use the "preview" mode to render, it goes quickly, but the image is often riddled with pixels. As you go up in quality, using the "Video", "Mid" and "High" modes, renders take longer but the pixels start disappearing into nice smooth satisfying surfaces/curves.

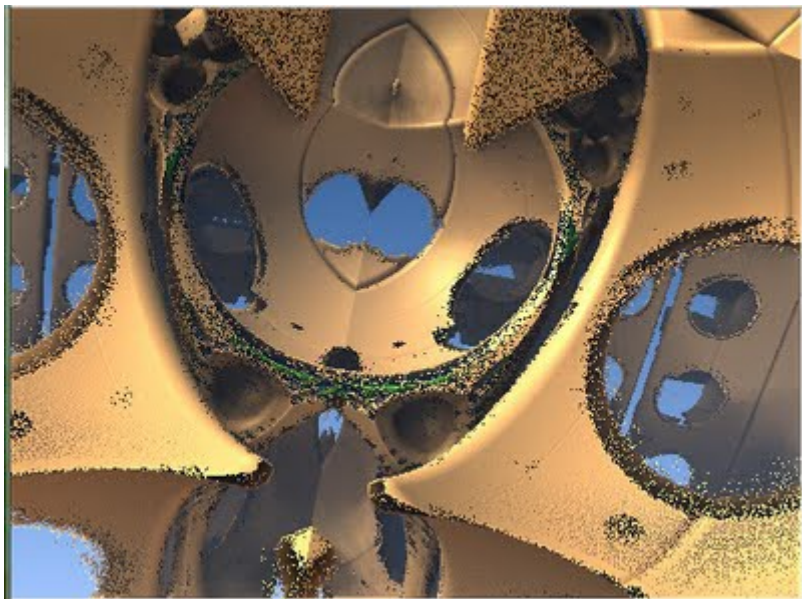
(Something to note is that, sometimes (really, not always) a render with "High" mode comes out looking very different (and usually much better-looking) than in "Preview" mode. So do not give up after "Viewing to Main" once. Try Video and Mid, see if the fractal changes for the better, etc)

Something else very important to note is that often, as I'm sure you've already encountered, what you see in the Navigator window is not all what comes out in the Render window. This is just one of those things... Sometimes, it'll just be the colouring that's different, and sometimes, it's the whole shape of everything, as is the case with the example I used for this Tut page. In fact, let me start here. I said I used *Amazing Box*:



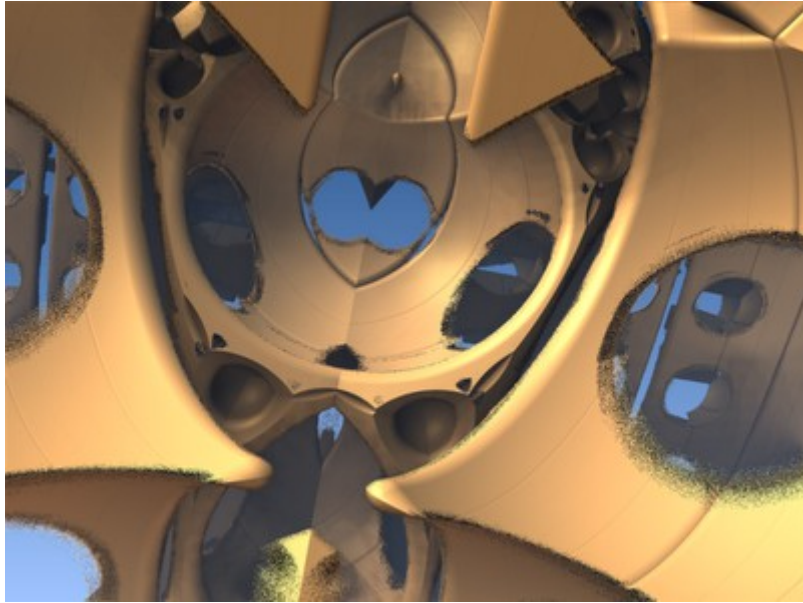
Zoom somewhere in Amazing Box in navigator window - 20 iterations

But then, when I clicked on view to main, and rendered the bugger in preview mode, I got this:

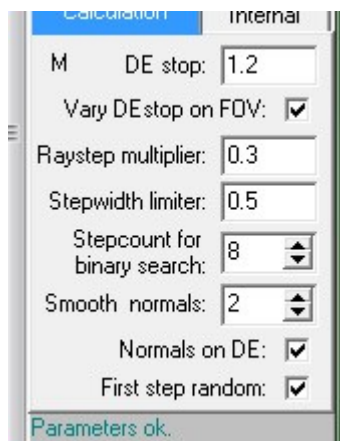


The above image, rendered in Preview mode

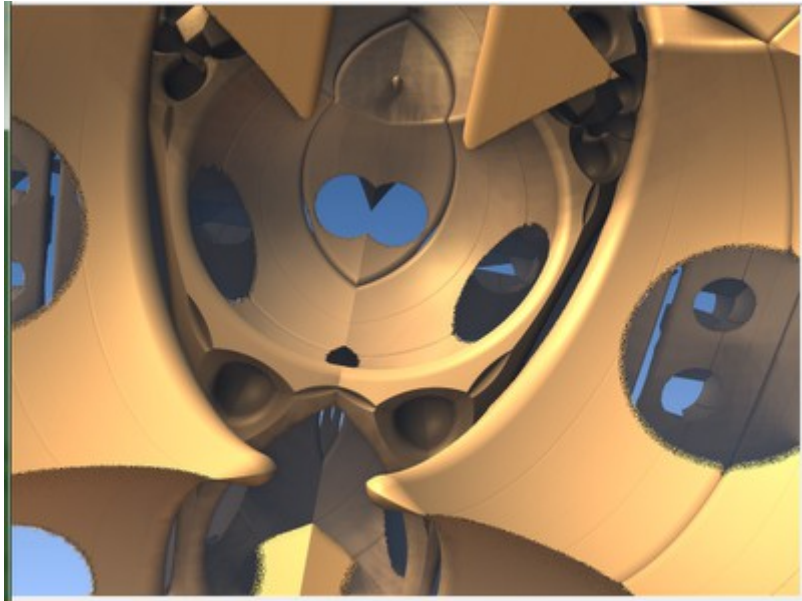
Not very nice, you know. Still, what can we do to this to improve it a little? I tried simply rendering it in "Mid" mode:



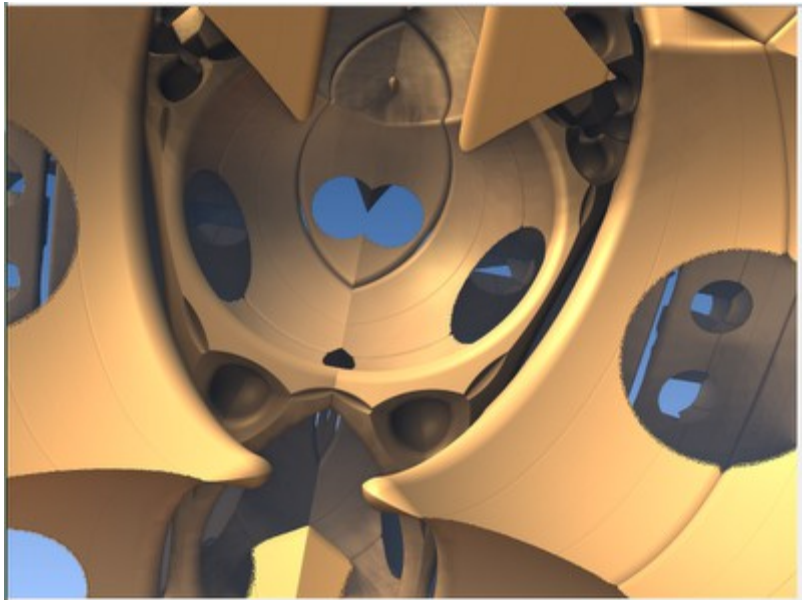
Aha! Much better, even if not good yet. So now, have you noticed the numbers changing in the little "Calculations" tab every time you changed from one mode to another? From Preview to Mid, for example. I decided I wanted to try changing them myself instead of choosing "High" .. So I kept it on "Mid" and just changed the Raystep multiplier and Stepwidth limiter values (see image below).



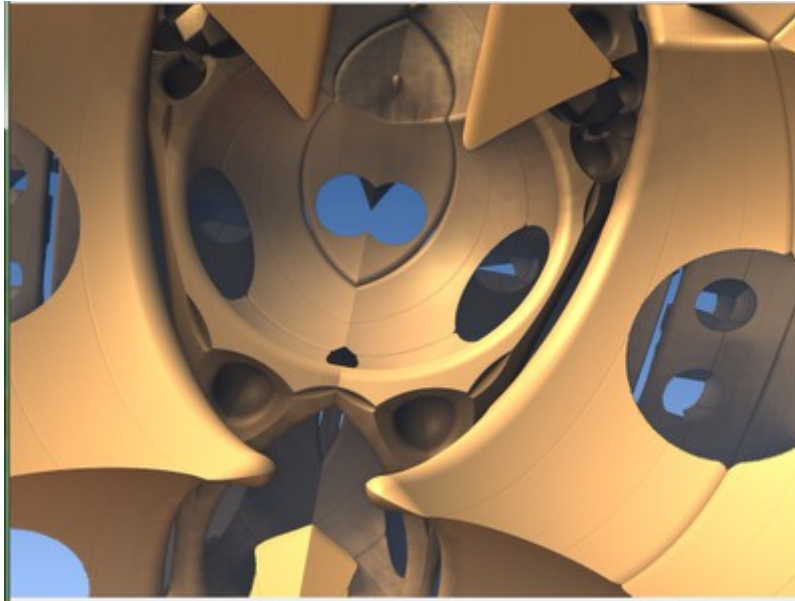
I changed them from the values above to 0.1 and 0.1 (which are even lower than the default settings of High Mode) and got this:



Much better! But still rather visible pixelation... If we lower the values even more, say 0.05 for both of them.. :



Almost there! The pixels are STILL visible though. So I dropped the values even lower, to 0.02. :



And voila! No pixels. But remember:

The lower you go with those two values, the longer the render is going to take. My first render of the above image in Mid mode took only a few seconds, whereas the above one took around 12 minutes. So if you have some awesome fractal image loaded, at 4000x3000 resolution, and try rendering it with Raystep Multiplier and Stepwidth limiter at 0.02, expect to wait a very long time for your render! ... I tried it, and ended up with something that took 21 hours!

The good news is that my above example here I chose for this tutorial page exactly because it had a lot of pixelation. This is truly not always the case. Most of the time you'll probably only have a little bit, so then you can lower the values little by little, until you're happy with the quality. If some pixels persist but you really don't want to wait for another long render, then Photoshop to the rescue! Manually sorting out those pixels can often be a much easier solution.

If my tutorial is helping you, please consider buying something from my [DeviantArt gallery](#). Photo-prints, Canvas prints, puzzles, mousepads and even mugs are available => ...

Mandelbulb 3D Tutorial: Julia Mode

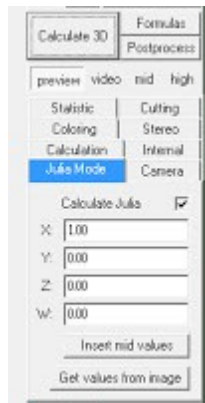
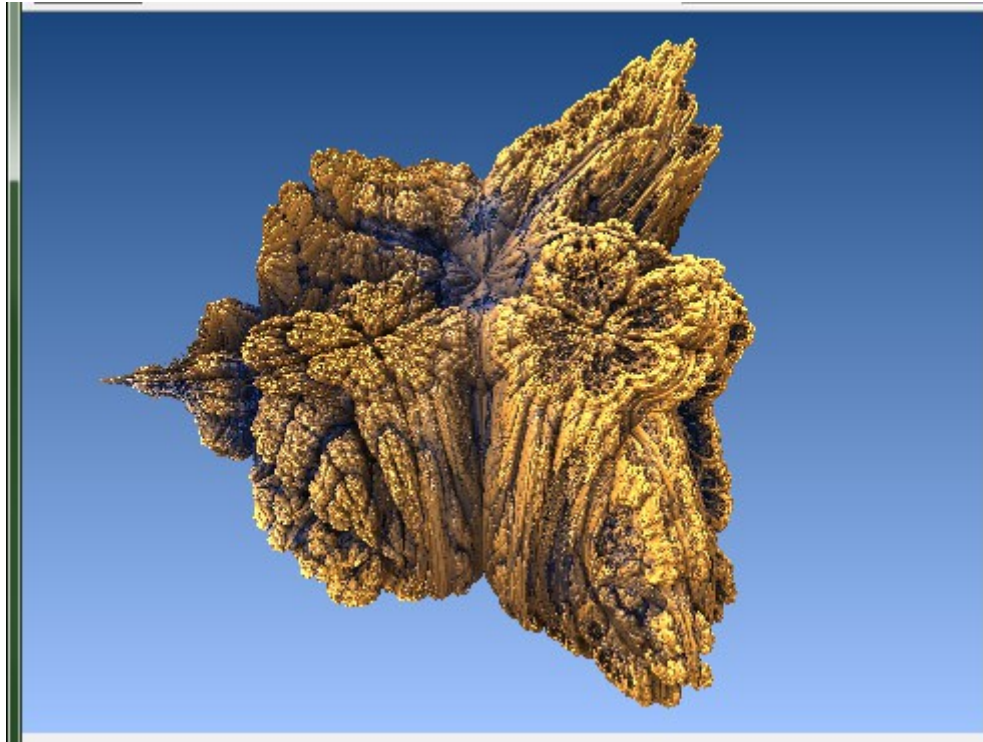
Ok, back once again for another M3D tutorial page!

I'm going to assume that most of you already know what a Julia fractal is. (Not that it is vital for you to be able to use the Julia mode tab in M3D ... But if you're one of those people who dove straight into M3D and 3D fractals because of how cool they look, and understand little else about Mandelbrot, or Julia, etc, go have a look at my [Introduction to Fractals tutorial](#). It will probably be worth it :)).

Ok, well, in M3D, just as 2D fractals are plotted out on the complex plane (cartesian x-y axis), 3D fractals are plotted out in a cartesian complex "space" (x,y and z .. There's a "w" too sometimes but I'm really not sure how that works (yet!)).

And just as every point on that complex plane has a corresponding Julia, so does every infinite "voxel" in the 3D complex space.

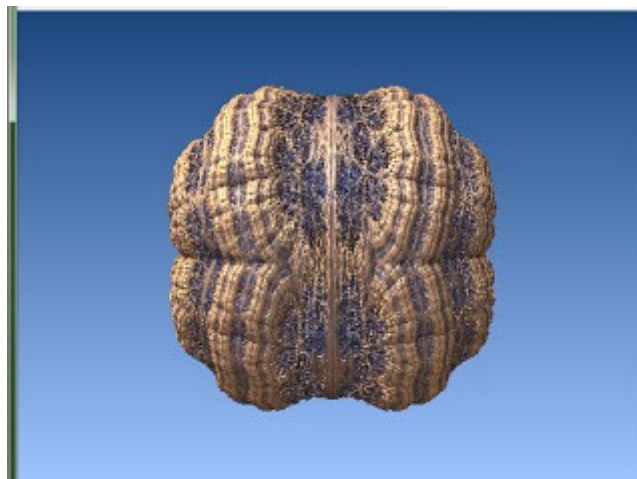
Don't worry if you don't understand this... Just go ahead and try it out. I loaded up the first formula on the list: Benesi1Pow2.



Then, I simply clicked on the Julia tab, checked the little "Calculate Julia" tick box (with $x=1$, the rest 0), and clicked the Calculate 3D button.



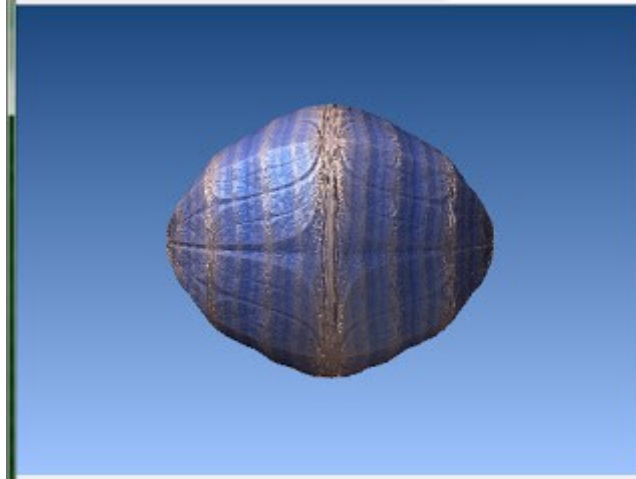
Not a very interesting fractal I know... But I then played around with the x,y and z co-ordinates, and here's what I got:



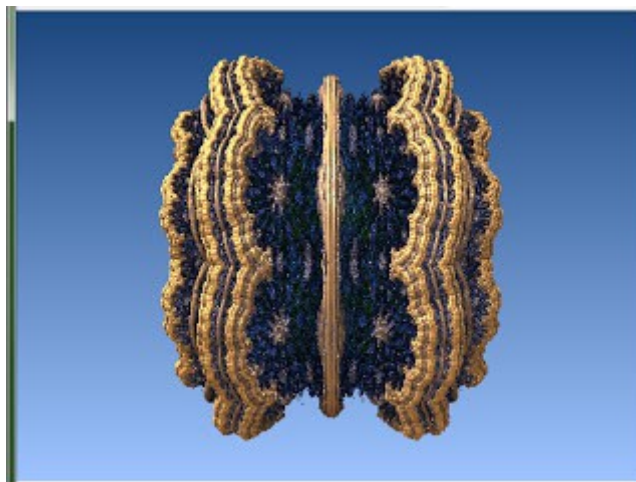
Benesi1Pow2Julia $x=0.1$ $y=0.4$ $z=0.2$



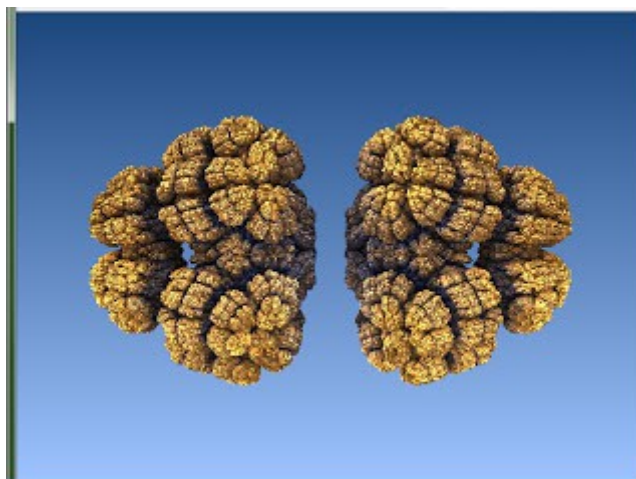
Benesi1Pow2Julia $x=0$ $y=1$ $z=0$



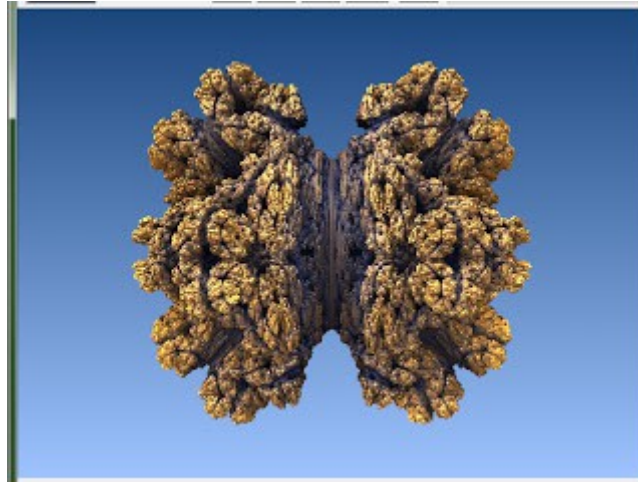
Benesi1Pow2Julia $x=-0.2$ $y=-0.1$ $z=0$



Benesi1Pow2Julia $x=0.5$ $y=0.5$ $z=0.5$



Benesi1Pow2Julia $x=-1$ $y=0.8$ $z=-0.4$



Benesi1Pow2 Julia $x=0$ $y=0$ $z=1$

As you can see, a lot of variation is possible with only one formula. And if you're zoomed into a Julia quite deeply, you can try tweaking one of the x , y or z parameters only very slightly, to see what changes :) ... It's a matter of trial and error, but some amazing images can be found...

My Fractal Worlds that I've just started (see previous blog entries) were all discovered using Julias of various hybrid formulae. (That's something to remember: You can combine different formulae and then apply the Julia, or you can choose one formulae, find a great julia, and then fuse it with some other formula.)

As they say at Fractal Forums, the possibilities are infinite.

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Mandelbulb 3D Tutorial: The 'DE combinate' button

Right! Back again for another tutorial page. I'm much more experienced now with Mandelbulb 3D, and have thought that I should do a revision of much of what I've already posted, but as that's not terribly exciting, and as I feel like doing something exciting, I'm going to try out the DE Combine feature of the formula box.

I learnt about this from two of my favourite 3D fractal artists, Mandelwerk and Bib, through the following works of theirs (and more):



Claustrophobia by Infinite Rooms by [Mandelwerk](#)



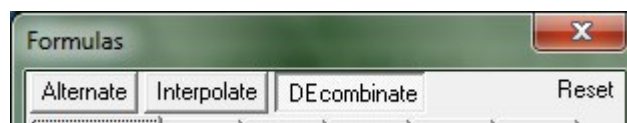
Two Worlds by [bib993](#)

So when I saw these amazing images, of course the first thing I wondered was 'How did they do it?' ... And the answer is DE Combine. As of right now though, I haven't tried using it yet. I like to keep my first time experiments for when I'm in blogging mode, so that you all learn with me as I go.

My intention is first to try and copy Mandelwerk's "Claustrophobia by Infinite Rooms" and Bib's "Two Worlds" and explain how I did it. Then I'll alter one of them, to test out DE Com features...

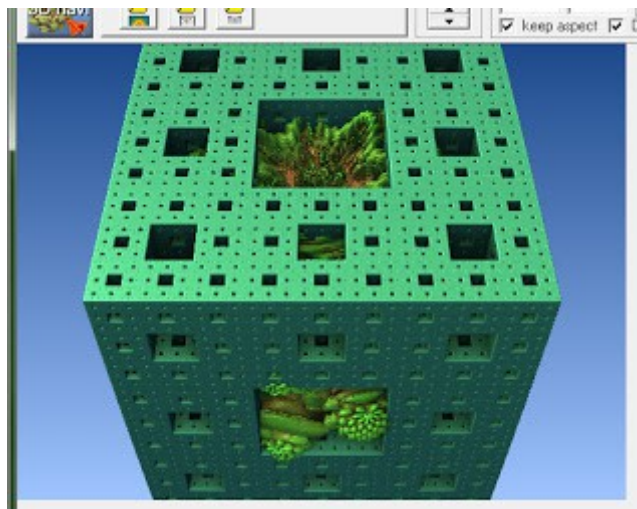
Let's go! >>>

.

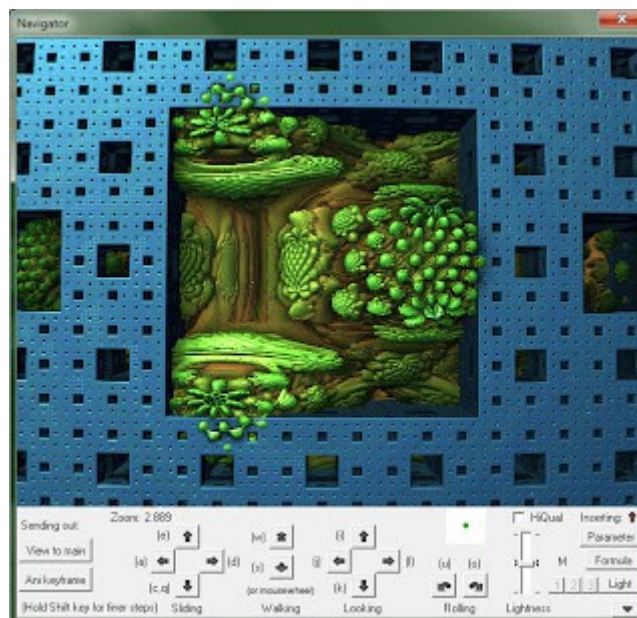


Alrighty... The first part was easy. Simply select the DE Combine button in the formula window

(default button is 'Alternate' (as seen above)), and then choose "MengerIFS" as your first formula, and "Integer Power" as your second formula. Click on Calculate 3D and this is what you get:



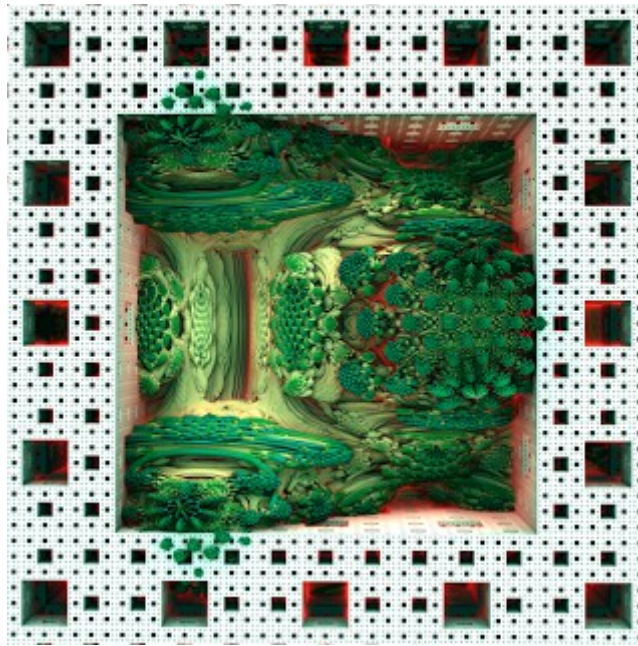
Next step, use the navigator to face the side of the cube:



Now it's just a question of colour, I think => .. And, the sides are curved, and Mandelwerk's original has very straight lines... Will try figure it out now.

<...>

Ok, so after an annoying amount of time trying to get his exact colouring, I've given up =P ... But I figured out the curved edges. In the main window, there's a tab called 'Camera' ... I tried clicking the 'Rectilinear Lense' and that did the trick => ... Then it's just a matter of fine tuning in the navigator and voila:



My attempt at duplicating [Mandelwerk's](#) version.

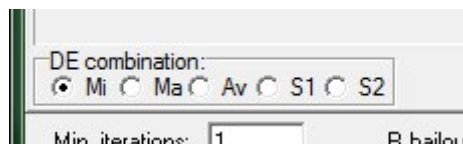
Next, Bib's very intimidating 'Two Worlds' as seen above.

Let me load the two formulae mentioned in the comments and see what I get...

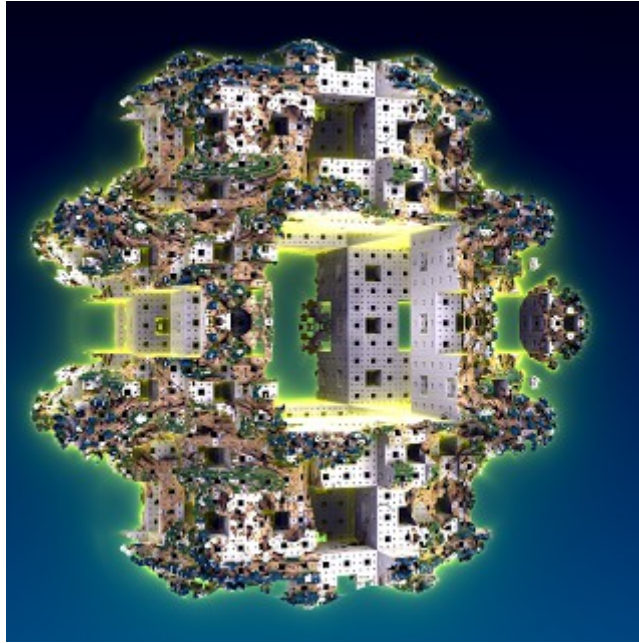
...

Uhm... Ok so nevermind that... =P ... I even asked him for some hints, and he gave me the four formulae he used, but no matter how I tweak the parameters, I can't figure out how he did it =P ... I'm thinking some background in advanced maths may be necessary...

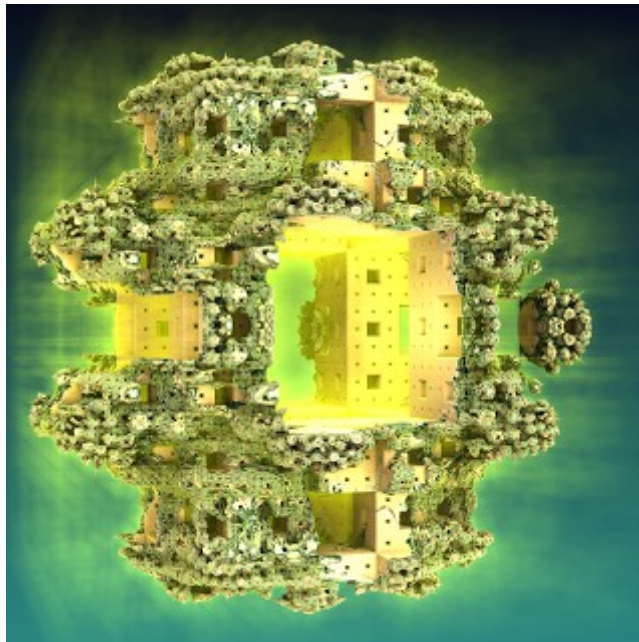
So now, on to some experimentation! I'll use my version of Mandelwerk's Claustrophobia. ... First things first, when you choose DE Combine in the formulae box, at the bottom of the first formula, this appears:



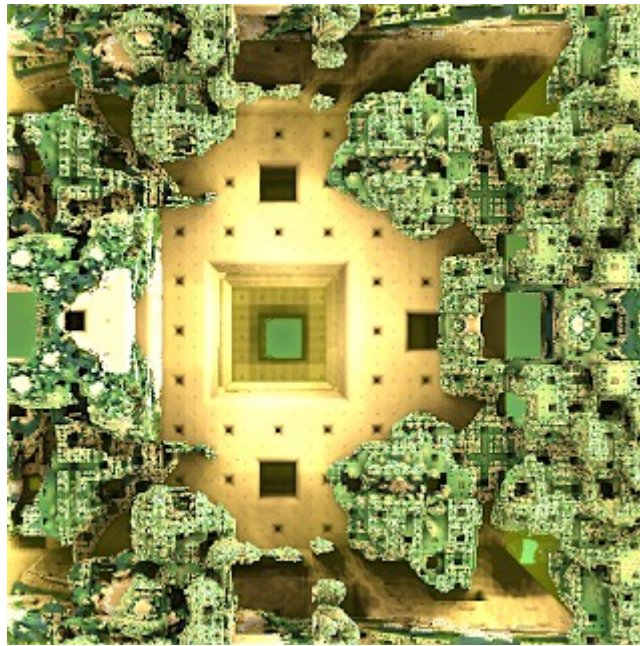
Just to see what happens, I chose the next option 'Ma' and rendered. As Jesse's little description popup-box says ... "only overlapping parts" .. of the two formulae, that is =) ... After repositioning (zoomed out and rotated) and some minor colour changes, this is what it looks like:



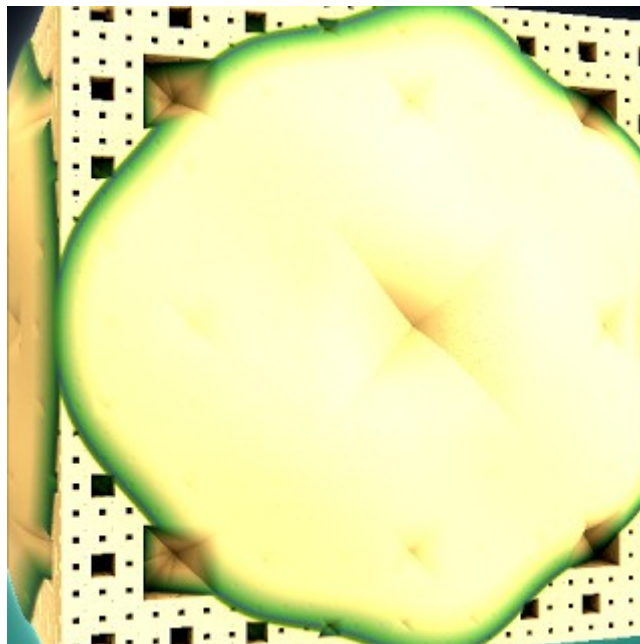
Next, I tried the 'Av' option, and got this (Note, it took much longer to render with this option.) :



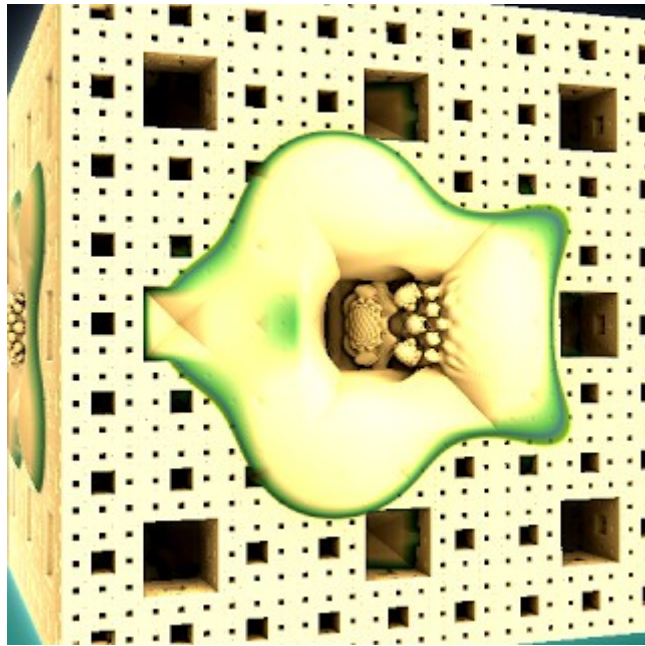
Here's a close-up, just to see:



The option 'S1' looks like this:



Then I changed the "Ds" value that appears if you choose 'S1' ... It is 0.5 by default. I tried 0.2 and got this:

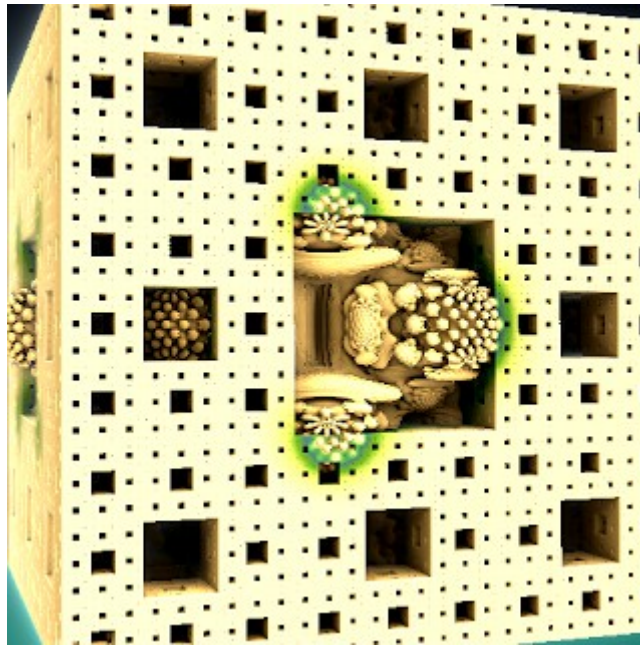


Then I zoomed into the center there and did a few colour changes to get this:



=)

And with $Ds. = -0.5$:



The option S2 you can check out for yourself... Not much different to S1 but remember that with different formulae, or even just with simple parameter tweaks, results can change drastically.

That completes the DE Combine tutorial ... Next, I'm hoping to cover that post-process tab ;)

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Posted by [Jody Lawrence](#)

Categories: [Formulas](#), [Fractal Art](#), [Mandelbulb 3D](#), [Tutorials](#)

~[siriusstarsage](#)

Jody VL