



Apophysis :— An Intermediate User Guide

By

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Introduction

Welcome to my intermediate user guide to using the great freeware application called **Apophysis**, also affectionately known as 'Apo'. I first downloaded this software on December 5th 2005 and I have been hooked on it ever since. The variety of fractals it is able to produce is only limited by your creativity but saying that, your creativity amounts to nothing if you fail to persevere despite the lack of documentation out there. The definitive starter guides are those by Lance and for scripting, by Datagram. Links to both (and much more useful stuff) can be found at The Fractal Farm website : <http://www.woosie.net/fracfan/viewtopic.php?t=15>

These guides help you with the GUI and offer some basic advice on creating fractals. This guide is different. Together we will create specific flames so you can see how they are done. By doing this I hope you will gain a better understanding of Apo and use the knowledge to create your own fractal wonders ☺ It is not intended to teach you the basics of the GUI, those are covered in the docs linked at The Fractal Farm. It will show you a few tricks that you may not be aware of.

I do not profess to be any kind of expert with the software. On the contrary, there is still much I have to learn. So please take this document for what it is – a guide.

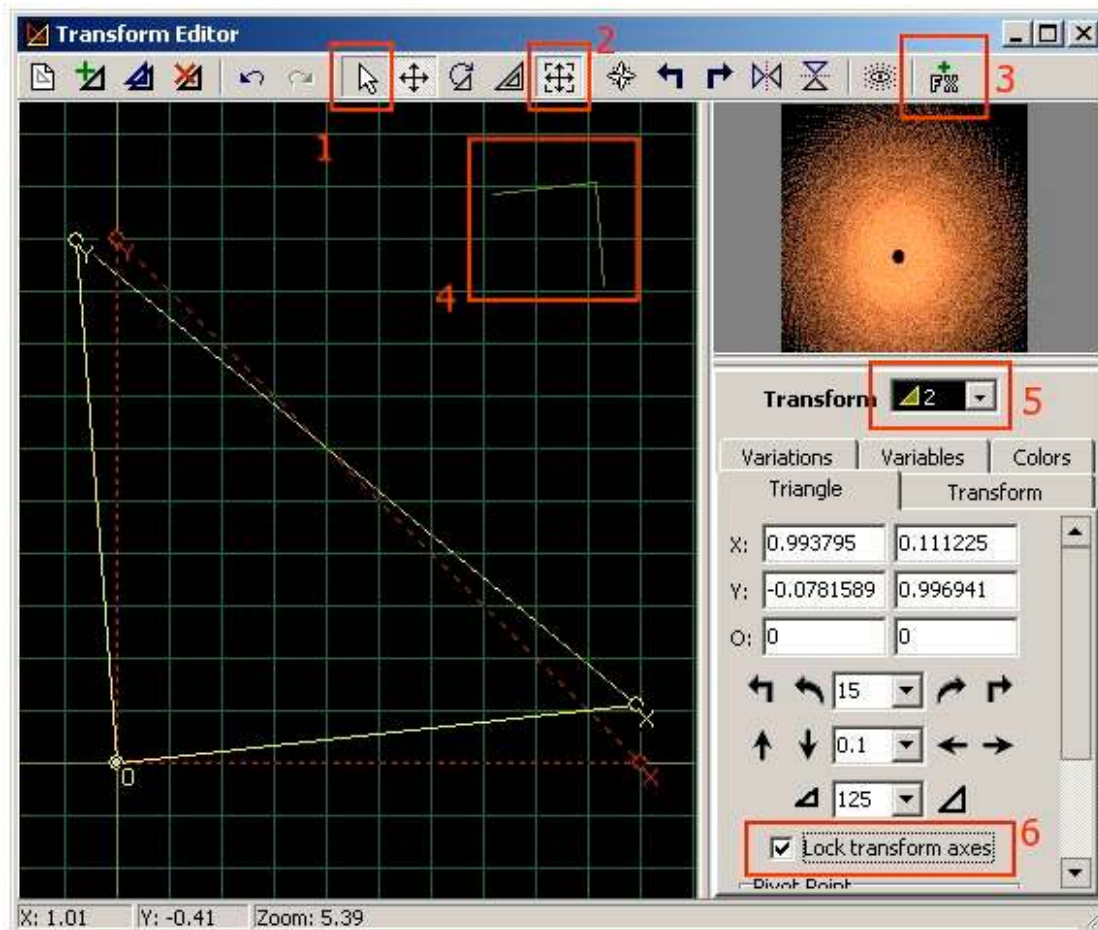
The version of Apophysis I will be using for this guide will be the much anticipated **2.04**. I say much anticipated as I am lucky enough to be a beta tester. I continually interchange the words triangle and transform so don't be confused by the switch, they mean the same. Apart from several new variations, 2.04 implements better memory management options when rendering an image to file so this may allow you to create larger images than you may have been able to previously. There is a trade off in that larger images take much longer to render. Although you would obviously expect this, the render times may come as a shock. On my system (Win2K Athlon 64 1.5GB) an 8000 x 8000 image at Q500, FR 0.4 and O/S 2 would take 22 hours approx whereas a 12000 x 12000 image would take 160hrs with the same settings.

Finally, please show respect for the artwork we are about to produce. Don't simply recolour it and try and pass it off as your own work – as great as it might look. Use the knowledge you gain here to fuel your imagination.

Now let's get cracking!

Working with the Editor

There are several changes to the editor in 2.04. We will cover them now. Apart from the new variations (covered later) the following image shows the most obvious ones:



1. The selection cursor button.

This isn't new I hear you say. Yes but this section is about more than new stuff, I hope to show you little tips to make life easier. The first one involves the selection cursor. How many time have you created a flame where all the triangles are fairly close so selection of one of them, or its control points, is difficult?

Tip No.1

Use the + / - keys *on your numpad* to identify the triangle you want (shown both at 5 in the image above and in the editor main window) to work with. Once you have done this click on the selection cursor button and you will ONLY manipulate the chosen

triangle and it's control points. Saves lot's of fiddling ☺. Just enable cursor selction (by clicking the button again) when you are ready.

2. Extended Edit Mode

This really is neat! By clicking this button you enable one click manipulation of triangles. If you pass your cursor over the active triangle you will square corners, as shown by 4 in the image above. The corners when dragged, rotate the triangle. In addition you can also do the following:

- a) Place the cursor over any of the sides of the triangles. You will see that two of the sides are full lines and the third is made up of dashes. When the cursor is over any of the full lines, dragging it will rotate **that side only**. Dragging the cursor whilst over the broken line (xy) will scale the triangle.
- b) Try this: select and drag one of the control points from a new triangle. Now you realise you didn't want to do that. Rather than using Ctrl-Z, double click on the control point. It will return to its default position.

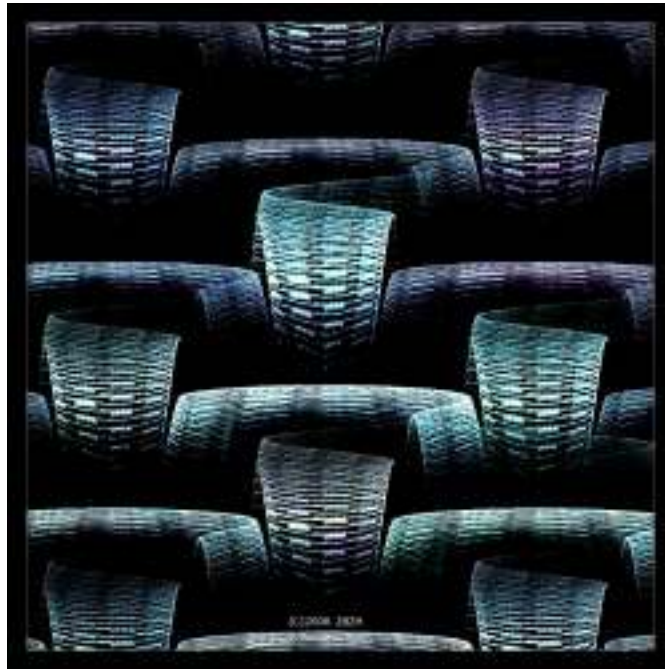
3. Enable Final Transform (aka Final Xform)

This has to be the biggest change to Apo and it will breathe life into old flames – trust me ☺

What is it?

Put simply. Clicking this button will add another white triangle to your flame. It will be in the default position with a variation of linear, set to 1 as with all new triangles. How this differs is this. Before when you manipulate a triangle (either by scaling, rotating or changing the variations) the effect on the flame was confined to the part of the flame directly influenced by that particular transform. Still with me? Good. If not you'll soon pick it up. Just read on. Now making any changes with the Final Xform will affect the **whole** flame and not just a part of it. Let me show you an example.

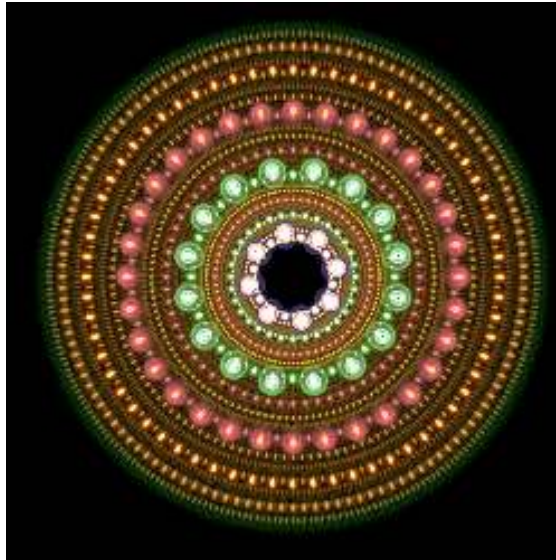
The following image, called Heavy Duty is a tiled fractal which could have been created in any version of Apo:



Now, using the Final Xform with a spherical variation setting (only) you get this:



Here's another before – a standard Julia Pattern (which, incidentally, is a pattern type we'll be covering later) :-



And after applying the Final Xform with the handkerchief variation (again only this):-



As you can see using the Final Xform has a **major** impact on your results and if nothing else, I encourage you to experiment with this.

There are a few things you need to know about the Final Xform. Firstly, only one can be applied (in this version) to your flame. This may change in the future. Secondly, to remove the effect, just click on the Enable Final Transform button again. The triangle still shows in the editor window. If you don't want this then the only way to remove it is to delete the Final Transform in the same way you delete other triangles. This will of course delete any settings you had in the Final Xform. Incidentally, the Final Xform is clearly labelled in the editor drop down (marked 5 in the editor screen shot at the start of this paper) so you always know when it's selected.

Note regarding scripts and the Final Xform:

Often when running a script it will add a Final Xform to your flame. Do not worry about this as it does not have any effect **unless you manipulate it**. If you do not intend to use it just delete it in the usual way.

5. Lock transform axes

When rotating a transform with this checked the **whole** transform moves as you have been used to. Uncheck it and **only** the side of the transform selected will move. In effect distorting it.

6. New variations

With this latest release comes several new variations. They are:

- a. noise
- b. blur
- c. julian
- d. juliascope

You will also notice that the last few in the list of variations are on a coloured background (this includes some of the variations in previous versions). If you select any of these it means they can be further adjusted by tweaking the values in the **variables** tab. This is also handy as I had never really explored this before.

I must admit, of the new variations I have used julian the most, followed by blur. Blur has been used by some artists namely Psion005 (psion005.deviantart.com) and Zueuk (zueuk.deviantart.com) with spectacular results. Grinagog (grinagog.deviantart.com) has an image in his 'scraps' at deviantArt that shows he is very close too and by the time this doc is complete, he may have resolved the problem.

I will show how to use the julian and, to a VERY limited extent, blur. I haven't really taken to any of the others so I won't be writing anything more about them.

Whilst we are talking about variations here's another tip or group of tips ☺:

Tip No.2

When changing the values in the variations section of the editor try the following:

- a) place the cursor over the variation name you want to change. The cursor changes to a hand**
- b) click the left mouse button and drag left to reduce the value and drag right to increase it. The amount goes into three decimal places**
- c) For other tuning hold down the following keys:**
 - i) Shift – 2 decimal places**
 - ii) Ctrl – 4 decimal places**
 - iii) Alt – 5 decimal places**
- d) double click on the variation name to zero the value**

This about does it for the Editor – at least until we get on to adding colour to the flames.

Tip No.3

Click anywhere in the main Editor window. Now you can manipulate the selected transform by using the following keys:

1. Translation:

- a. Arrow key – moves the transform the currently set units.**
- b. Ctrl + arrow key: 1/10 of the current translation setting i.e if you have it set at 0.5 units, it will move 0.05**
- c. Shift + arrow key: 10 x current translation setting**

2. Rotation:

- a. Page Up or Page Down key or Alt key + arrow key combo – rotates the transform the currently set amount. Page Up rotates anti-clockwise, the others clockwise**
- b. Ctrl + Page Up/Down key: set rotation / 6 (yes 6 ☺)**
- c. Shift + Page Up/Down key: set rotation x 6**

3. Scale

- a. Home/End keys – scale up or down the selected amount**
- b. Ctrl + Home/End keys – scale up or down half the selected amount**
- c. Shift + Home/End keys – scale up or down 1.5 times the selected amount**

4. Add/Delete Transforms:

- a. Insert – Add a transform at the centre**
- b. Delete – delete the currently selected transform**

Using My Metallica Script

Below is the latest version of my Metallica script. This code produces a specific type of fractal which can be pin sharp and colourful. I discovered this technique quite early in my Apo days (lol, not as though I've been using it for years) and I was dumbstruck when I saw the result. I soon realised this lended itself perfectly to scripting so I wrote one ;)

```
{*****
Metallic Strip Script - Version 4
by Carl Skepper 9th April 2006
web: www.ivy-cottage.net
aka 2B2H (2b2h.deviantart.com)
email: carl.skepper@ivy-cottage.net
Objective: To create a horizontal tiling effect with narrow upper
and lower strips made up of smaller versions of the original flame
http://www.ivy-cottage.net

*****}

h1 := 2; //horiz spacing
v1 := 1; // vert spacing
s1 := 20; // scale (for upper and lower bands)
clearFlame := 'y'; // flag for user choice - apply to current flame or start a new one
if not InputQuery('Metallica v4','Do you want to clear the current flame? (y/n). The
default is "y" :','clearFlame )then
exit;

if not InputQuery('Metallica v4', 'Horizontal Spacing (Between 1 and 5, suggest 2):',
h1) then
exit;
if not InputQuery('Metallica v4', 'Vertical Spacing (Suggest half of horiz spacing):',
v1) then
exit;
if not InputQuery('Metallica v4', 'Scale factor % (try 20 to start):', s1) then
exit;
s1 := s1 * 0.01;

// If the user wants to start a new flame -
// then clear the old one and add two new transforms

if (clearFlame = 'y') or (clearFlame = 'Y') then
begin
Clear;
AddTransform;
AddTransform;
Rotate(180);
end;

// Add the strip creation transforms
```

```

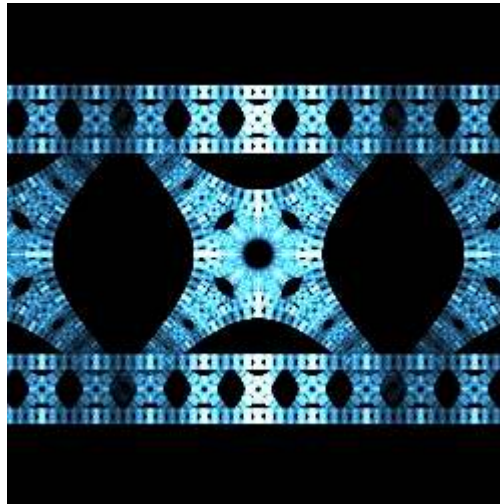
// The first 4 dictate the horizontal spacing of the pattern
AddTransform;
Transform.e := Transform.e + h1;
CopyTransform;
Rotate(180);
AddTransform;
Transform.e := Transform.e - h1;
CopyTransform;
Rotate(180);
// The next 4 dictate the vertical spacing and how narrow the edge bands are
AddTransform;
Transform.f := Transform.f - v1;
Scale(s1);
CopyTransform;
Rotate(180);
AddTransform;
Transform.f := Transform.f + v1;
Scale(s1);
CopyTransform;
Rotate(180);

//*****

```

Previous users of this script will notice some changes. Firstly I have added the option to apply the script to a current flame. I haven't used this much so it's effect isn't tried and tested. To revert to the 'old' method, just leave the 'y' at the first prompt. The second change is that the starter variation is always linear. I have removed the random variation code because I think it restricted the use as users were finding the same fractal often. This was because at the time the 'random' variation was only random in the sense it was one of the 32 or so variations possible with the version of Apo I was using. By removing this code it will force users to experiment and with this in mind, let's create a flame using it. The final change to the script was the suggested values shown at the prompts are now the defaults.

1. Step 1 – run the script and leave the default values
2. This will give a linear and not well defined flame. If you don't see anything then try changing the gradient. Sometimes the random gradient chosen by Apo is so bad you don't see anything in the preview window
3. Make the linear variation 0 and the Julia variation 1 in both Transform 1 and 2
4. This will give a better fractal but it's still not best ever. Now using the method from **Tip No. 2** reduce the value in the Julia variation in both triangles and you will get a sharp flame. Values around 0.3 or 0.4 did it for me. The following image is the result:



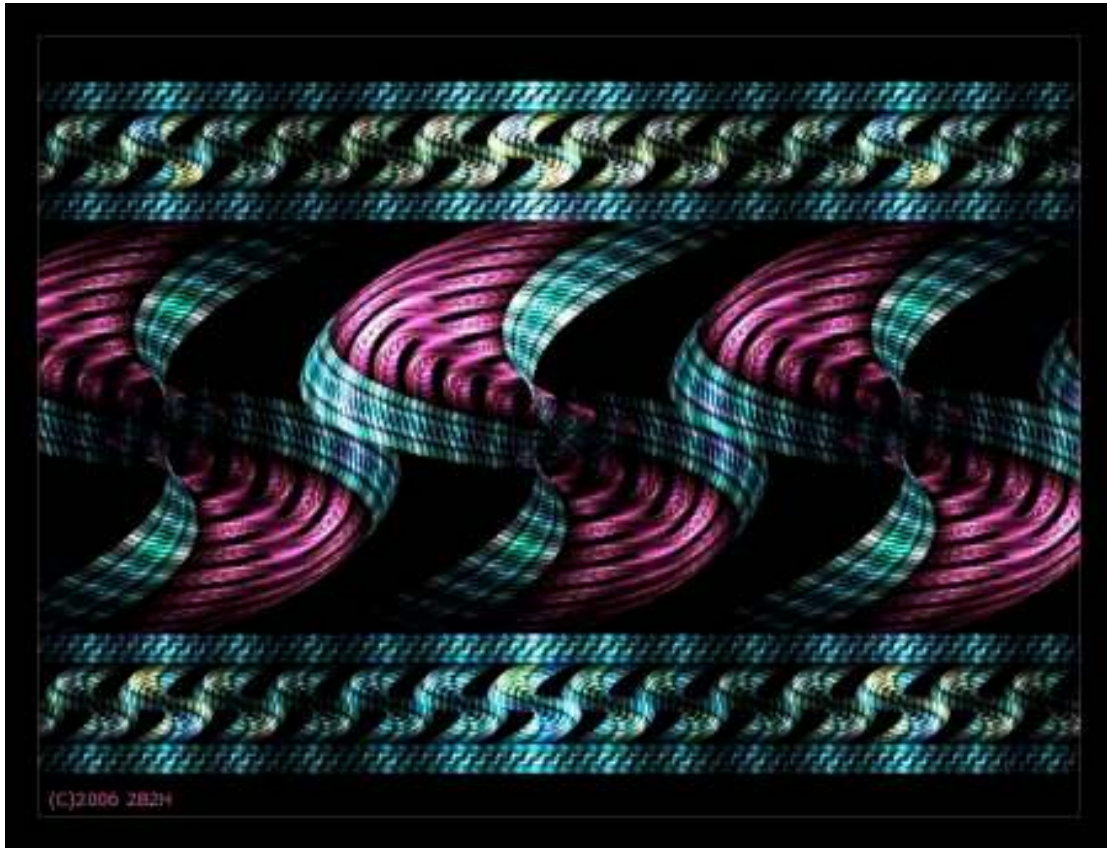
How it works

The first two triangles are used to create the basic pattern. The remaining 8 do nothing other than tile the pattern in a specific way. These 8 triangles all have the same variation of $\text{linear}=1$. So to change the fractal you only really need to change the first two triangles. You can do more if you like to alter the spacing. However, changing anything in the 8 'linear' triangles destroys the effect. To change the spacing of the top and bottom bands just move the top and bottom pairs of triangles (Transforms 7,8,9 and 10) up or down. If you remember when you started the script you were asked for horizontal and vertical spacings. You could enter different values to see the effect.

That's really all there is to this script. The emphasis is on scaling the first two triangles to focus the fractal. Try using multiple variations and you can get some really cool fractals using this. I called these fractals 'Watch Straps' as that is what they reminded me of. Here are a few I created using the above method:



And the final (finest?) example:



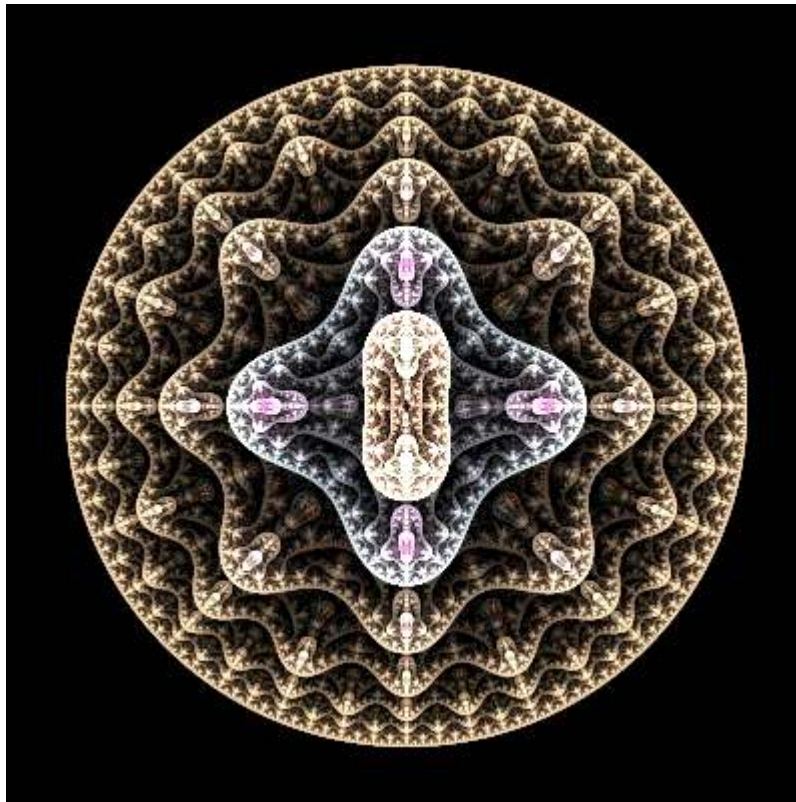
Falling in love with Julia (and Julia n)

I have a confession to make. I love this variation ☺ . There, it's out. Don't tell the wife.

I find this one of the easiest variations to work with and I go through phases where I will create fractals which are heavily reliant on this variation. Julia variation was in previous versions of Apo. Julian (Julia n) is new. Julian basically gives you much greater control over the Julia fractal. We will now create a flame using Julia then repeat the starting steps with Julian and makes some neat modifications ☺.

Step by Step Instructions.

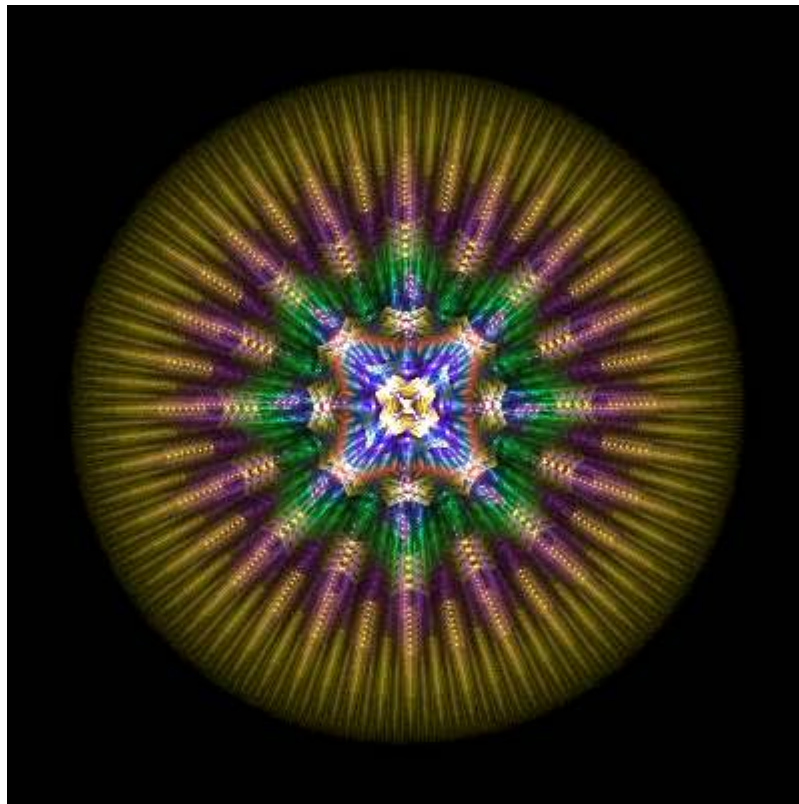
1. Create a New Blank Flame using the toolbar button in the Editor.
2. Select transform 1 and flip it horizontally. This is to make it easier to work with other transforms more than anything.
3. In both triangles set linear variation to 0 and **julia** to 1. The preview should show a perfect circle.
4. Add a third triangle. Set Julia to 0.25 and move it vertically 0.5 units.
5. You should already see a change in the preview. Depending on your gradient you should see something similar to the following:



You could simply play with the variation setting in these transforms to create numerous flames. To create 'satellites' around this image do the following:

6. Add Transform
7. Set linear to 0 and Julia to 0.75
8. Move this triangle 4 units upwards.
9. Copy it
10. Hit the space bar. This will now force any rotation about the origin 0,0
11. Rotate the copy 180 and you will now have 4 satellites. Making further copies and rotating them by varying amounts will add more but possibly at a cost of reduction of colour variation.

By experimentation you will achieve a lot of fractals using this technique as a basis. Here are some examples:



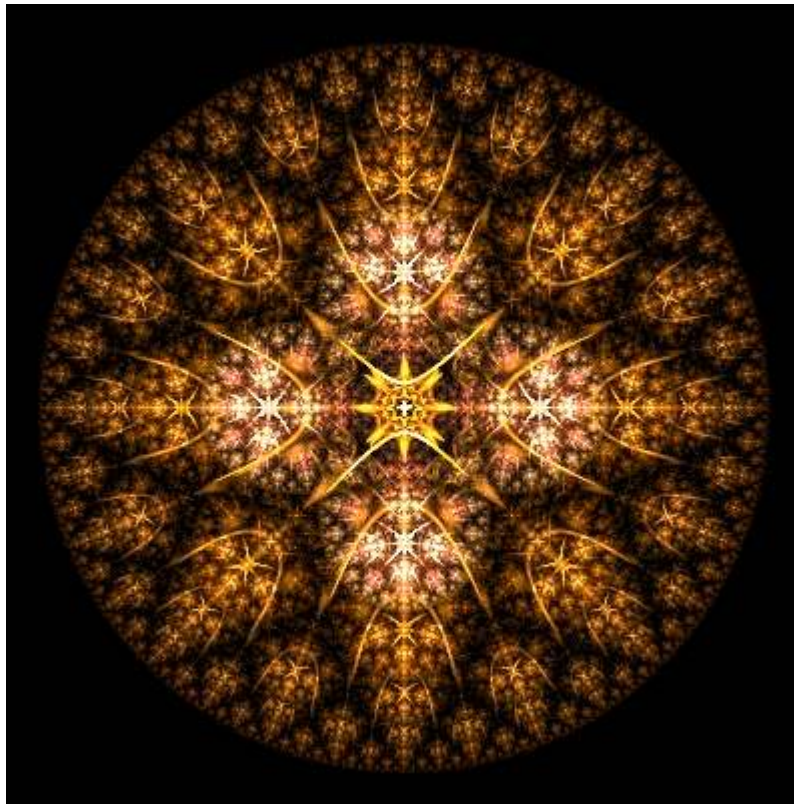
Here is the parameter file for you you examine:

```
<flame name="2b2hUrchin" size="400 400" center="0.00840142659615006 0.000754844302416124"
scale="54.34" angle="0.796742803535411" rotate="-45.65" zoom="-0.359" oversample="1"
filter="0.1" quality="50" background="0 0 0" brightness="24.4" gamma="2.68" >
  <xform weight="0.5" color="0" julia="2" coefs="-1 0 0 1 0 0" />
  <xform weight="0.5" color="1" julia="0.75" coefs="0.2 -0.5 0.2 0.5 0 0" />
  <xform weight="0.5" color="1" symmetry="1" sinusoidal="0.029" coefs="-0.256 -0.256 -0.256 0.256
0 -1" />
  <xform weight="0.5" color="0" julia="2" coefs="0.8 0 0 -0.8 0 0" />
  <colors count="256"
data="00E5DE2C00E7DD2E00E9DC2F00ECDC3000EEDB3200F0DA3300F3D93400F5D836
00F7D83700FAD73900FCD63A00F9D03F00F6CB4400F4C54900F1C04E00EEBA53
00ECB45800E9AF5D00E6A96200E3A46700E09E6C00DE987100DB937600D88D7B
```

00D6888000D3828500D07C8A00CD779000CA719500C86C9A00C5669F00C261A4
00C05BA900BD55AE00BA50B300B74AB800B445BD00B23FC200AF39C700AC34CC
00AA2ED100A729D600A423DB00A129D5009E30CF009B36CA00983DC4009543BE
009249B8008F50B3008C56AD00895DA7008663A10083699B00807096007D7690
007A7D8A0077838400748A7E00729079006F9673006C9D6D0069A3670066AA62
0063B05C0060B656005DBD50005AC34A0057CA450054D03F0051D639004EDD33
004BE32E0048EA280045F0220045E9280044E32F0044DC350043D53B0043CF41
0042C8480042C14E0042BA540041B45B0041AD610040A6670040A06D003F9974
003F927A003E8C80003E8586003E7E8D003D7893003D7199003C6AA0003C64A6
003B5DAC003B56B2003A50B9003A49BF003A42C500393BCC003935D200382ED8
003827DE003721E500371AEB003D1CE500431FDE004A21D8005023D2005625CC
005C28C500622ABF00692CB9006F2EB2007531AC007B33A6008135A000883799
008E3A9300943C8D009A3E8600A0408000A6437A00AD457300B3476D00B94967
00BF4C6100C54E5A00CC505400D2524E00D8554700DE574100E4593B00EB5B35
00F15E2E00F760280002D6EB0006CFEB0009C9EB000DC2EB0011BCEC0014B5EC
0018AEEC001CA8EC001FA1EC00239AEC002794ED002A8DED002E86ED003280ED
003579ED003973ED003C6CEE004065EE00445FEE004758EE004B52EE004F4BEE
005244EE00563EEF005A37EF005D30EF00612AEF006523EF00681CEF006C16F0
00700FF0007309F0007702F0007402F0007102F0006E02F0006B03F0006803F0
006503F0006203F0005F03F0005C03F1005904F1005604F1005304F1005004F1
004D04F1004A04F1004804F1004505F1004205F1003F05F1003C05F1003905F1
003605F1003306F1003006F2002D06F2002A06F2002706F2002406F2002107F2
001E07F2001B07F2001807F2001D0EEB002216E400261DDD002B24D600302BCE
003533C700393AC0003E41B9004349B2004850AB004D57A400515E9C00566695
005B6D8E0060748700647C8000698379006E8A720073916B00789964007CA05C
0081A7550086AE4E008BB6470090BD400094C4390099CC32009ED32A00A3DA23
00A7E11C00ACE91500B1F00E00B3EF0F00B6EE1100B8EE1200BAED1400BDEC15
00BFEB1600C1EA1800C4EA1900C6E91A00C8E81C00CBE71D00CDE61E00CFE520
00D2E52100D4E42300D6E32400D9E22500DBE12700DEE12800E0E02A00E2DF2B"/>
</flame>

Note: In order to use the params in version 2.03c and earlier you need to remove the spaces in the data section. Copy them into notepad (or similar), delete the spaces then copy and paste the parameter details into Apo in the normal way.

The next example is one of my 'deviations' at DeviantArt.com and is titled Solarity. It is on the next page.



```

<flame name="2B2HSolarity" size="400 400" center="0.0259883114496029 -0.0318311410914605"
scale="104.31" zoom="-1.191" oversample="1" filter="0.1" quality="50" background="0 0 0"
brightness="36.8391304347826" gamma="2.68" >
  <xform weight="0.5" color="0" julia="2" coefs="1 0 0 -1 0 0" />
  <xform weight="0.5" color="0.25" julia="2" coefs="1 0 0 1 0 0" />
  <xform weight="0.5" color="0.5" linear="-0.008" julia="0.792" coefs="0.38017 0.010323 0.391165
0.001986 -0.468796 -0.128315" />
  <xform weight="0.5" color="0.75" linear="-0.008" julia="-0.066" coefs="-0.012309 -0.270788
0.05744 -0.246171 -0.002467 -0.003113" />
  <xform weight="0.5" color="1" julia="1.047" coefs="0.64 0 0 -0.64 0 -2" />
  <xform weight="0.5" color="1" julia="1.047" coefs="-0.64 0 0 0.64 0 2" />
  <colors count="256"
data="00FF000000FD0A0200FB0F0300FA140400F9190500F81E0600F7200600F72307
00F42D0800F3320900F2370A00F13C0B00F0410C00EE460D00ED4B0E00EC4D0E
00EC500E00EA5A1000E85F1100E7641200E6691300E56E1400E4701400E47315
00E17D1600E0821700DF871800DE8C1900DD911A00DC931A00DB961B00DA9B1C
00D9A01C00D89D1E00D89B1F00D89A2000D7982000D7972100D7962100D79622
00D6922400D5912500D5902600D58E2600D58C2700D48B2700D48B2800D48A29
00D4882A00D3852C00D2832C00D2822D00D2802E00D27F2F00D17E2F00D17E30
00D17A3100D0793200D0783300CF763400CF743500CF733500CF733600CE7237
00CE703700D1713400D2713200D4723000D5722F00D6722E00D7732D00D9732B
00DC742800DD742600DF752400E0752200E2762100E2762000E3771F00E5771D
00E6781C00EA791800EB791600ED7A1500ED7A1400EE7A1300F07B1100F17B0F
00F47C0C00F57C0A00F77D0900F87D0800F97E0700FA7E0500FC7F0300FD7F02
00FF800000FA7E0000F77C0000F57B0000F47A0000F37A0000F0780000EE7700
00E9750000E6730000E4720000E2710000E1710000DF700000DC6E0000DA6D00
00D86C0000D36A0000D1690000D0680000CE670000CB660000C9640000C66300
00C1610000BE5F0000BC5E0000BB5D0000BA5D0000B75C0000B55A0000B25900
00B0580000B55F0800B6600A00B7620C00BA651000BC681500BF6C1900C16F1D
00C6762500C8792900CB7C2D00CC7D2F00CE7F3200D0833600D3863A00D5893E

```



```

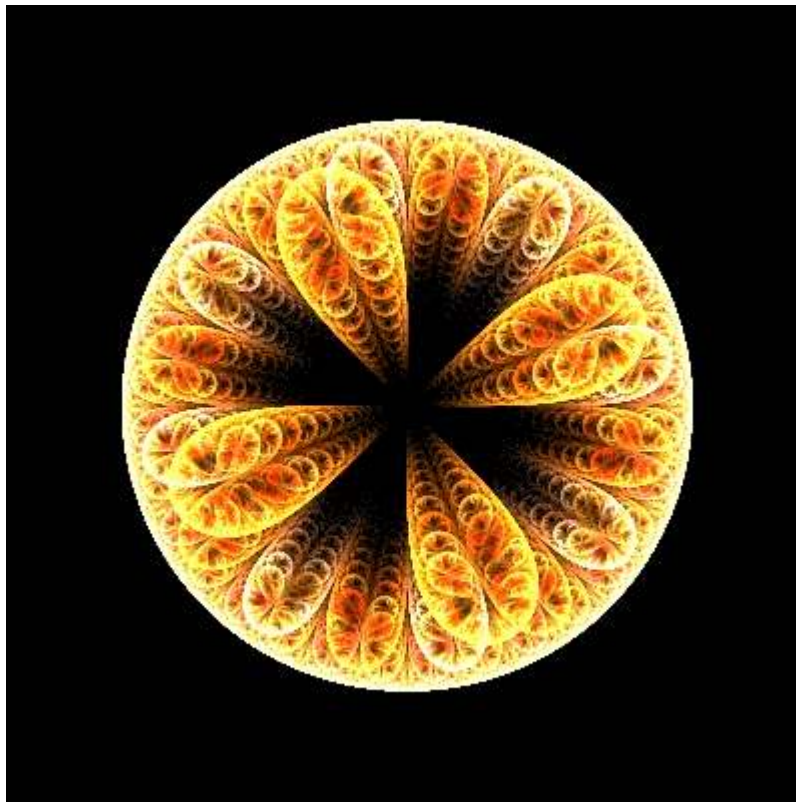
00D88C4200DC934A00DD944C00DF964E00E19A5200E49D5700E6A05B00E9A35F
00EEAA6700EFAB6900F0AD6B00F3B16F00F5B47400F8B77800FABA7C00FDBE80
00FFC18400FFBA8000FFB87F00FFB67F00FFB27D00FFAE7B00FFAB7900FFA777
00FFA07400FF9E7300FF9C7200FF987000FF946E00FF916C00FF8D6B00FF8969
00FF866700FF826500FF7E6300FF7A6200FF776000FF735E00FF6F5C00FF6B5A
00FF645700FF625600FF605500FF5D5300FF595100FF554F00FF514E00FF4E4C
00FF44A4A00FE4D4B00FC4F4C00FB524C00FA544D00F8574E00F75A4F00F55C4F
00F45F5000F3615100F1645100F0675200EE695300ED6C5400EC6E5400EA7155
00E9745600E8765600E6795700E57B5800E47E5900E2805900E1835A00DF865B
00DE885B00DD8B5C00DB8D5D00DA905E00D8935E00D7955F00D6986000D49A60
00D39D6100D39E6300D49F6400D4A06600D5A16800D5A26900D6A36B00D6A46C
00D6A56E00D7A67000D7A77100D8A87300D8A97400D9AA7600D9AB7800DAAC79
00DAAD7B00DAAE7D00DBAF7E00DBB08000DCB18200DCB28300DDB38500DDB486
00DDB58800DEB68A00DEB78B00DFB88D00DFB98E00E0BA9000E0BB9200E1BD95"/>
</flame>

```

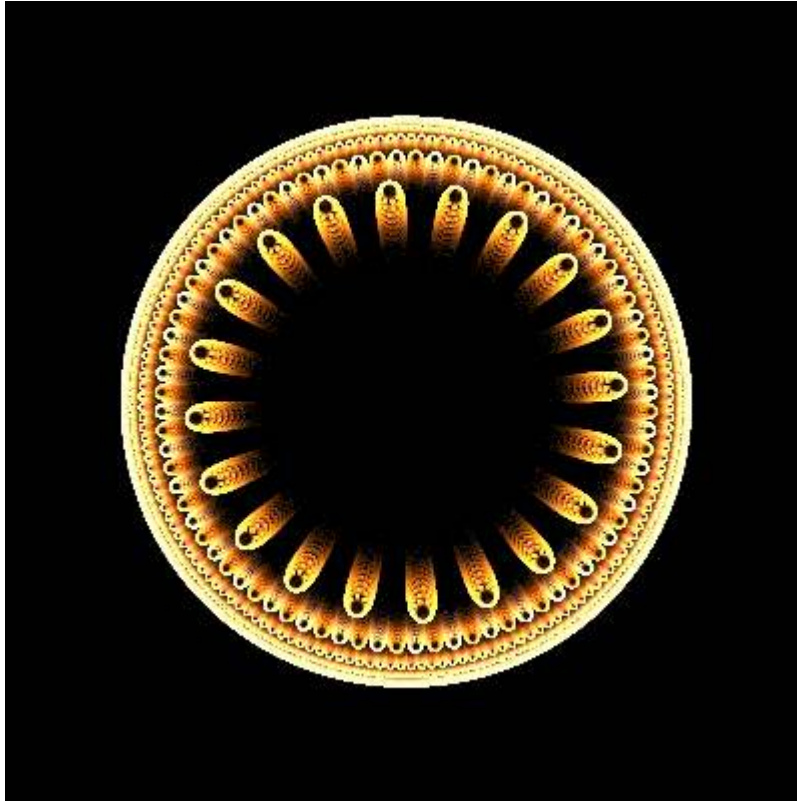
I think these should give you enough examples on how you can use the Julia variation. Now for something with a bit more control - **Julian**

Step by Step – Julian

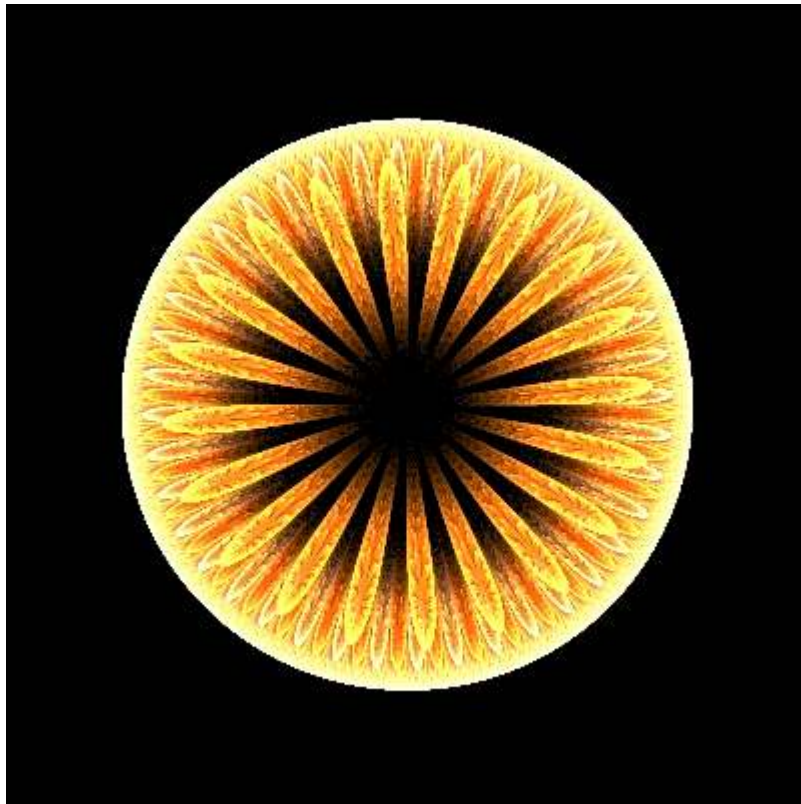
1. Repeat steps 1-5 above, replacing **Julia** with **Julian**. At step 4 move the newly added triangle 1 unit instead of 0.5. This is what I get (remember you may have something different depending on your gradient):



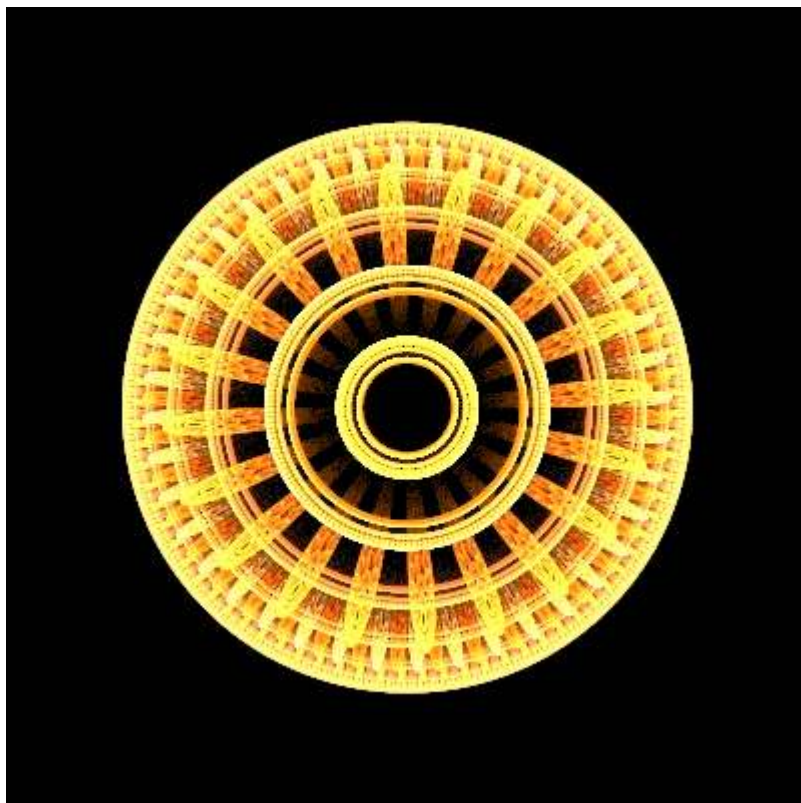
Now the fun bit ☺ Switch to the **variables** tab. We are only interested in the **julian_power** and **julian_dist** values. Change the value in julian_power to any integer (whole number) – say 8 and watch the change in the preview. Here is what I get with a value of 20 (!):



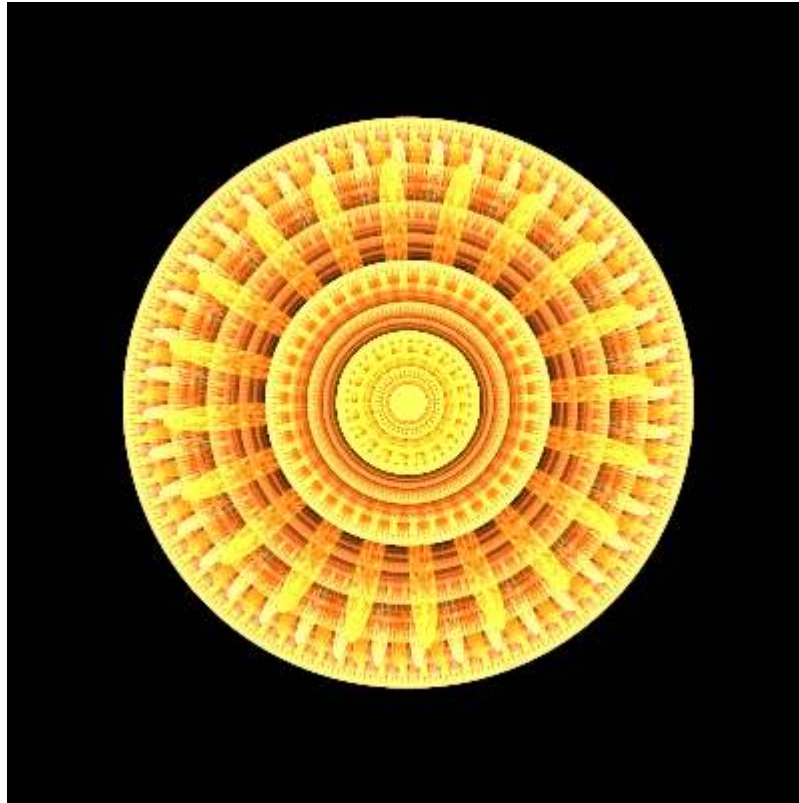
Starting to look interesting eh? The middle is a bit bare so lets try and put some interest there. Entering 4 in Julian_Dist does this to the previous image (see image, next page). Again you can experiment with values here (they have no need to be integer btw). Some **really** cool stuff can be done with these settings, but we haven't finished with our flame just yet



The middle is still not complete so lets add interest. Add another transform. This time after removing the linear (set it to 0), set julian at 0.5 without moving it. This is my result:



Now this is getting interesting. Time to tweak some more.... Set both the Julian_Power and Julian_Dist variables to 1. This fills the middle nicely:



This gives you an insight into the power on Julian. Here is the param file for the previous image:

```
<flame name="2B2HJulian" size="400 400" center="-0.00173617559048694 -  
0.000126149121412233" scale="142.375" oversample="1" filter="0.1" quality="50" background="0 0  
0" brightness="36.8391304347826" gamma="2.68" >  
  <xform weight="0.5" color="0" julian="1" coefs="-1 0 0 1 0 0" julian_power="2" julian_dist="1" />  
  <xform weight="0.5" color="1" julian="1" coefs="1 0 0 1 0 0" julian_power="2" julian_dist="1" />  
  <xform weight="0.5" color="0" julian="0.75" coefs="1 0 0 1 0 -1" julian_power="20"  
julian_dist="4" />  
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/>  
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```

```

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00B0580000B55F0800B6600A00B7620C00BA651000BC681500BF6C1900C16F1D
00C6762500C8792900CB7C2D00CC7D2F00CE7F3200D0833600D3863A00D5893E
00D88C4200DC934A00DD944C00DF964E00E19A5200E49D5700E6A05B00E9A35F
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</flame>

```

Tips

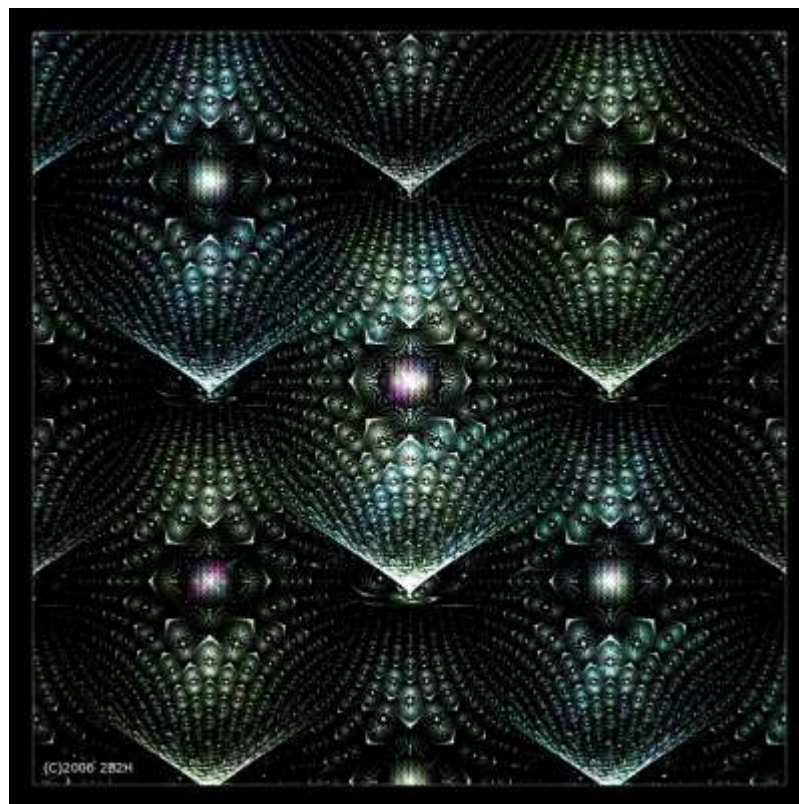
As I have already stated, I have used the julia /julian variation **a lot**. Here are a few ideas for you to try:

- Try adding triangles with different **julian** values. Larger values expand the flame diameter
- Try mixing **julian_powers** in the same flame – they don't have to be the same value. Don't be afraid to try small values or larger ones like 64 or higher. Remember you can use whole numbers only in this field. Try negative values too 😊
- Try mixing values for **julian_dist** too These can also be negative values 😊
- Move the triangles further away from the centre. If the edge pattern gets too small just scale the triangle larger
- Try deforming the triangles.

We will be using the Julian again later but that should be enough to whet your appetite 😊

Tiling

I have kind of dreaded writing this section in particular because I don't yet feel its an area of Apo that I have sufficiently got to grips with. In addition to Zueuk, Psion005, Grinagog I would add MichaelFaber to the list of experts in this area. I think I have got close with some aspects but it's not quite there. Perhaps you will unlock the key? One of the most (if not **the** most) important aspects of repeating patterns is the placement of what I term the patternmaker transforms. These are the triangles that are placed to repeat the pattern. Going back to the Metallica script as an example. Of the 10 transforms created by that script, the last 8 are purely to repeat the pattern in a very precise way. After discovering this I figured this was the way to go to tile. At this time I am still very much experimenting and until I get it right I don't feel confident releasing any teachings on the subject. When i do eventually master it that should change. I apologise for any disappointment to those looking for a solution to mastering this technique. The only reason I have included this section is because tiling is a popular flame type and I reason that something should be included – even if it is somewhat negative at this time. However, all is not lost. What I will do is show a few images and give you the parameter files so you can get an idea as to how they were done. Who knows, maybe you can find the 'missing link' and tell me how to do them properly! Firstly my favourite in this series: Dragonscales

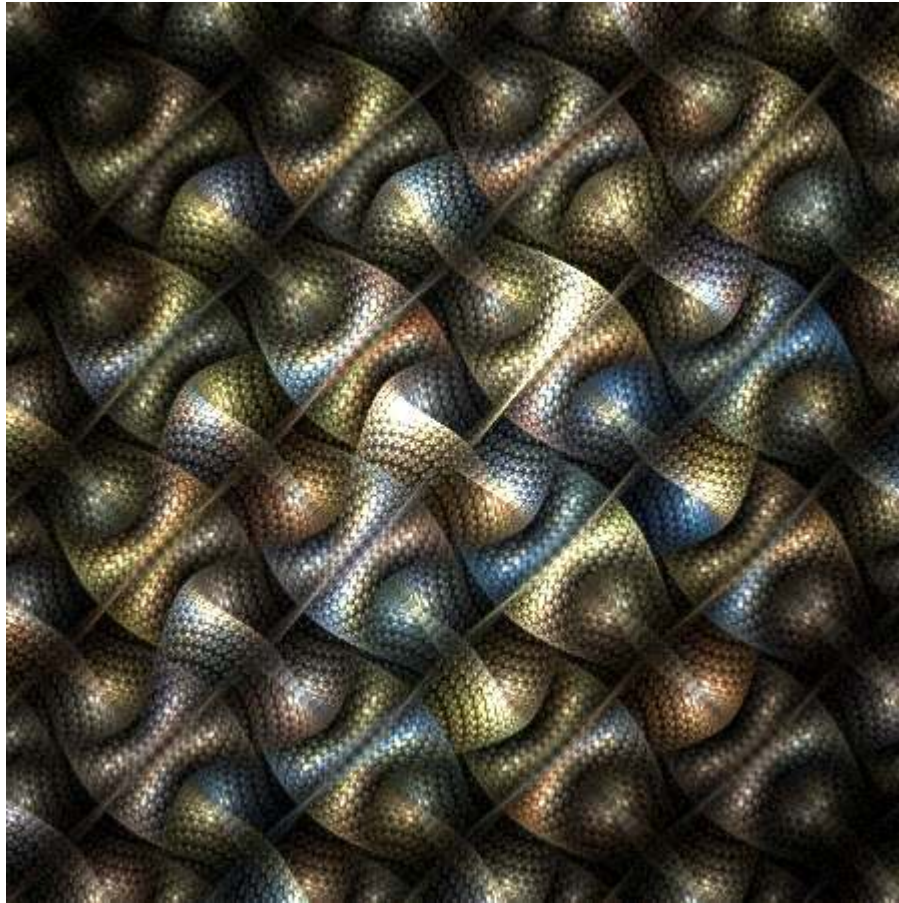


```

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  <xform weight="0.5" color="0.490701110335067" linear="1" coefs="1 0 0 1 0.75 -0.75" />
  <xform weight="0.5" color="0.085411346051842" linear="1" coefs="1 0 0 1 0.75 0.75" />
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  <xform weight="0.5" color="0.683" symmetry="1" linear="0.721" polar="-0.848" coefs="-0.083886
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  <colors count="256"
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</flame>

```

Next, a previously unpublished flame:

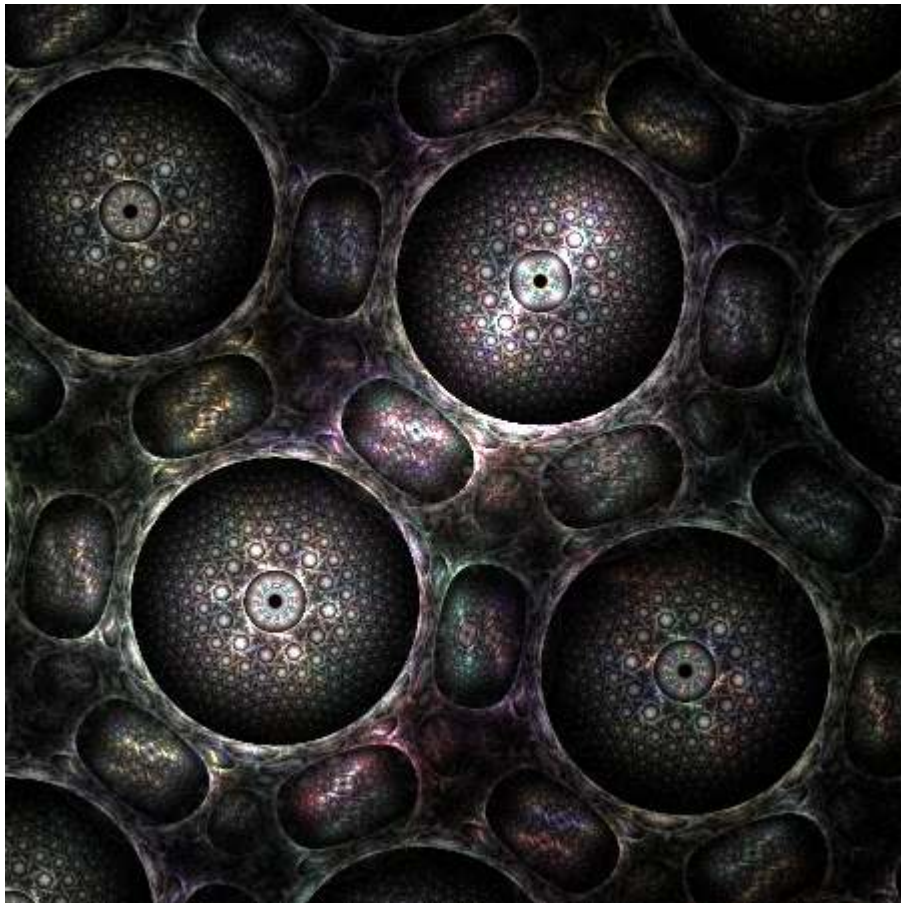


```
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  <xform weight="0.5" color="0.234370272373781" linear="1" coefs="-1 0 0 -1 1 0" />  
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  <xform weight="0.5" color="0.340553615707904" linear="1" coefs="-1 0 0 -1 1 -1" />  
  <xform weight="0.5" color="0.427122345892712" linear="1" coefs="1 0 0 1 -1 1" />  
  <xform weight="0.5" color="0.41815753467381" linear="1" coefs="-1 0 0 -1 0 0" />  
  <xform weight="0.5" color="0.687" handkerchief="0.31" coefs="0.091904 -0.110284 -0.091904 -  
0.09453 -0.06849 -0.981838" />  
  <xform weight="0.5" color="0.634" linear="0.1878" handkerchief="-0.16" coefs="0.167772 0 0  
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```



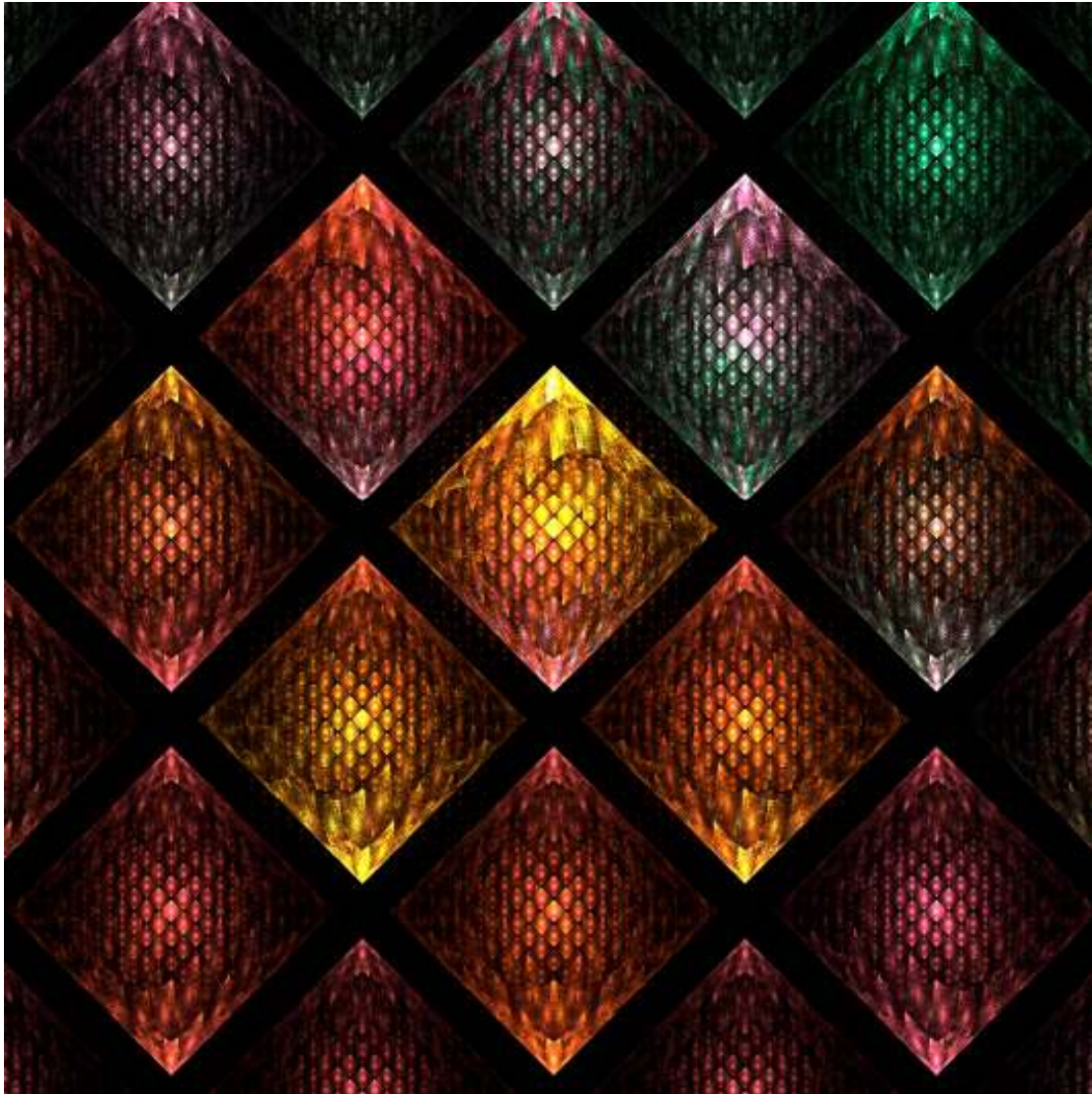
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```

The next one (another deviation) shows a slightly different method of transform placement:



```
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oversample="1" filter="0.1" quality="50" background="0 0 0" brightness="5" gamma="3"
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0 -3" />
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0 -3" />
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And a final one...



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  <xform weight="0.5" color="0.216" diamond="0.926" coefs="0.290472 0.167704 -0.167704
0.290472 0 -2" />
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```

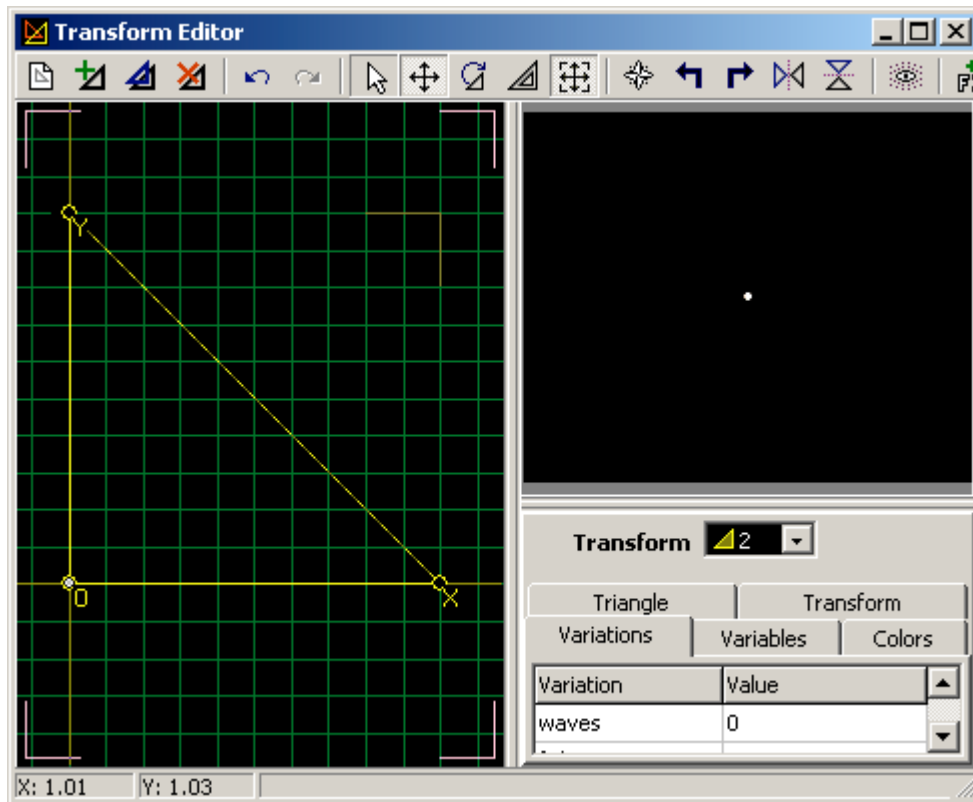
Update (May 2006)

Now I have had a chance to experiment some more I am in a better position to help with this type of flame. I had done a lot of trial and error stuff but I felt I wasn't quite there and it was getting frustrating. That's when I moved on to try other flame types to enjoy Apo knowing I can come back to tiling at a later time. It was during one of these 'breaks' that I completed the first version of this tutorial. The response has been fantastic ☺ Why am I telling you this now? Well it was as a direct result of publishing this I had two Apo artists contact me and provide me with some important clues to see where I was going astray with tiling. The first was **Michael Faber** and the second was **L33tM0b113** (aka Tweekz or 4nub1s). Both sent me tile flame parameters. When I saw Michael's the reality hit me like a train! Before we start tiling let me share some of my earlier findings about Apo flames. Please bear with me. If you stick with this it may help you understand what's going on when you manipulate those triangles. It won't take long, I promise. ☺

Patterns 101 – Setting our Stall out

As usual, step by step....

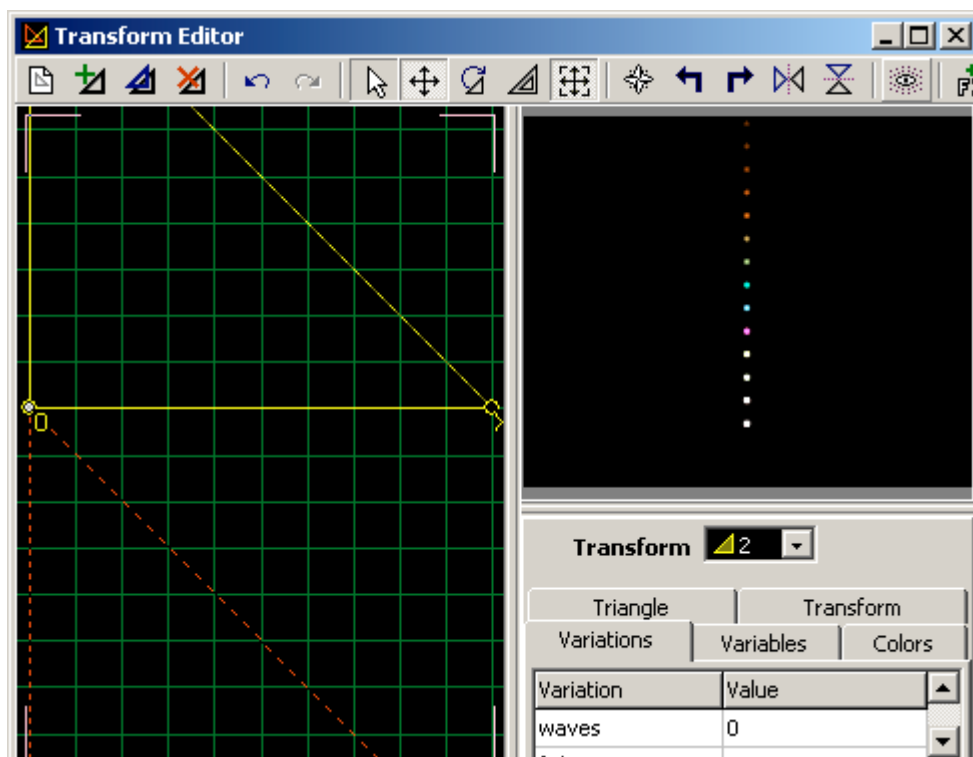
1. New Blank Flame
2. In Transform 1, set blur to 0.1. All others = 0
3. Look at the Editor preview window....



As you can see – there is one blob in the centre of the screen. What I want you to do is watch this preview screen carefully.

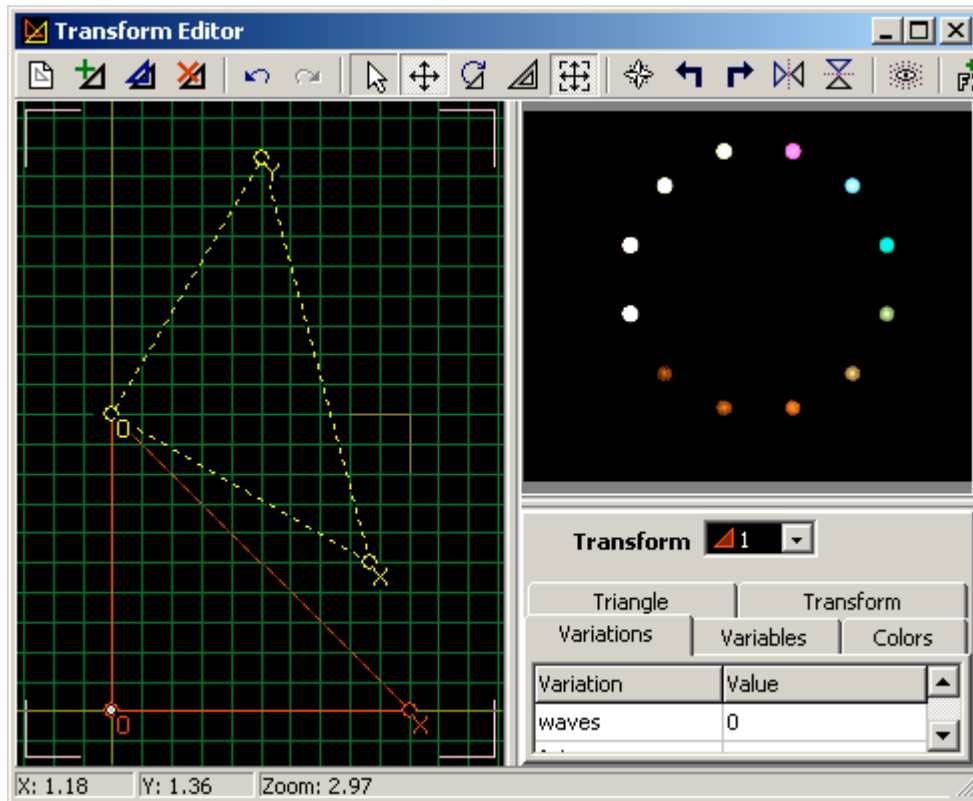
4. Move Transform 2 one unit up:

Each one of those dots represents where the variation will start from. You can see the dots are getting fainter as you move further from the centre.



Now for some interesting stuff...

5. Rotate Transform2 30 deg clockwise:



6. Now rotate it another 30 deg (see image next page). Can you now see why I did this exercise? But wait we haven't finished yet ☺
7. Rotate Transform2 another 30deg (making 90 in total) – see the second image on the next page.

Btw you may have to adjust your Master Scale to see this clearer.

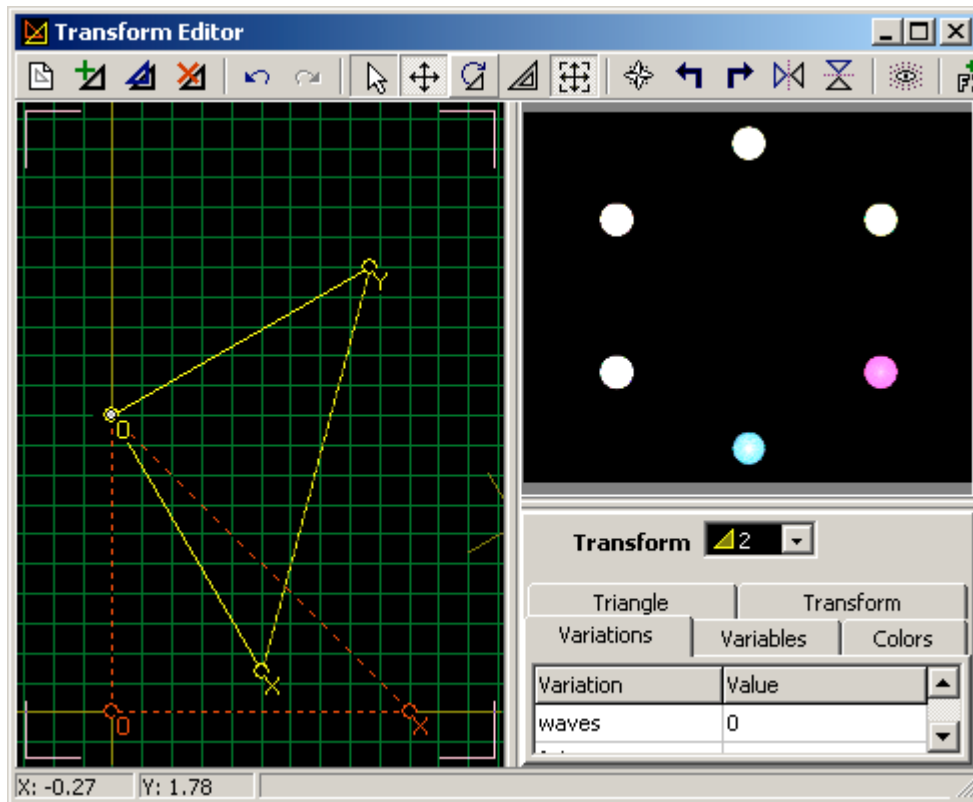


Image after rotating Transform2 60degrees clockwise

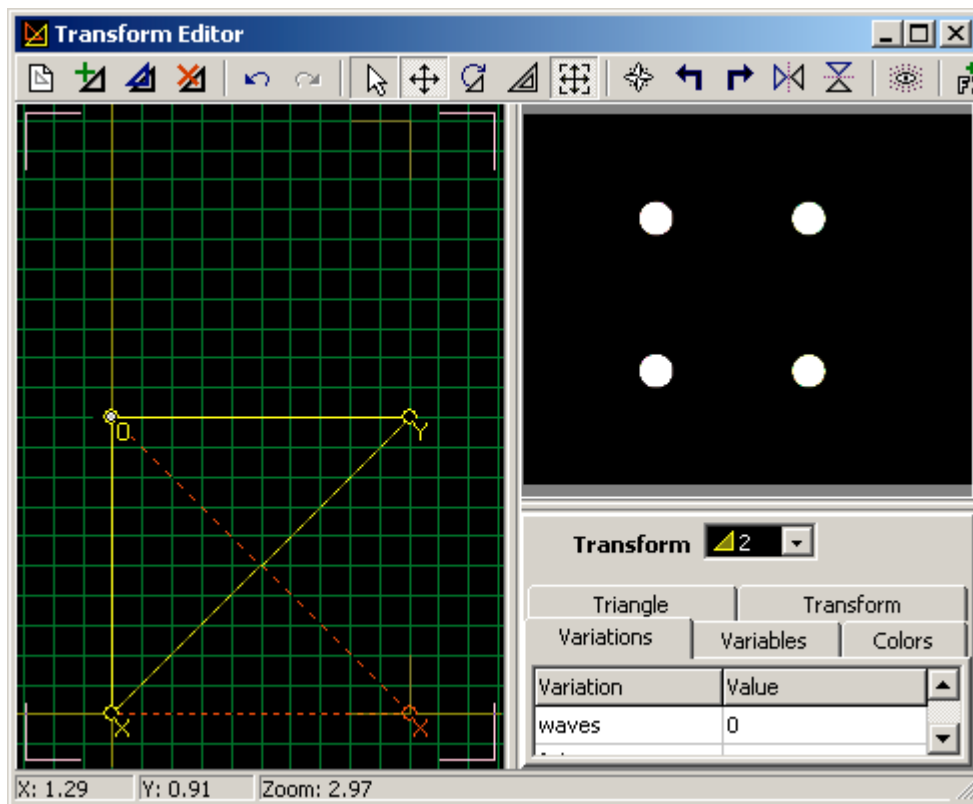


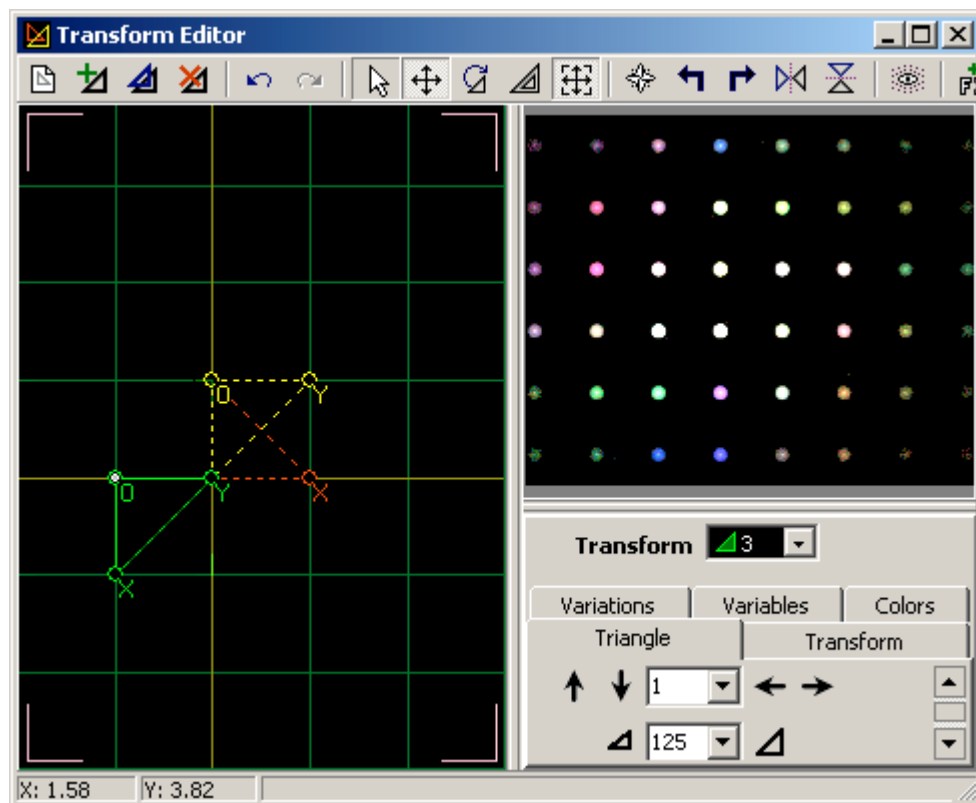
Image after rotating transform2 90 degrees

So, armed with this knowledge we can set our flame up for square, hex, octagonal tiling (I'll let you find that one for yourselves ☺) or more although I

have yet to try anything greater than hex myself. So how can we use this? Well, We see from each screenshot that the variation will be duplicated in specific ways, depending how much the 'tiling' transforms are rotated. What we need to do now is duplicate whichever tile-style we want and place the copy transforms so we maintain the clean pattern, but it repeats it all directions. Lets take the simplest, the square:

8.Add a transform. Now because we want repeating patterns, rotate this triangle 90 deg as we did earlier

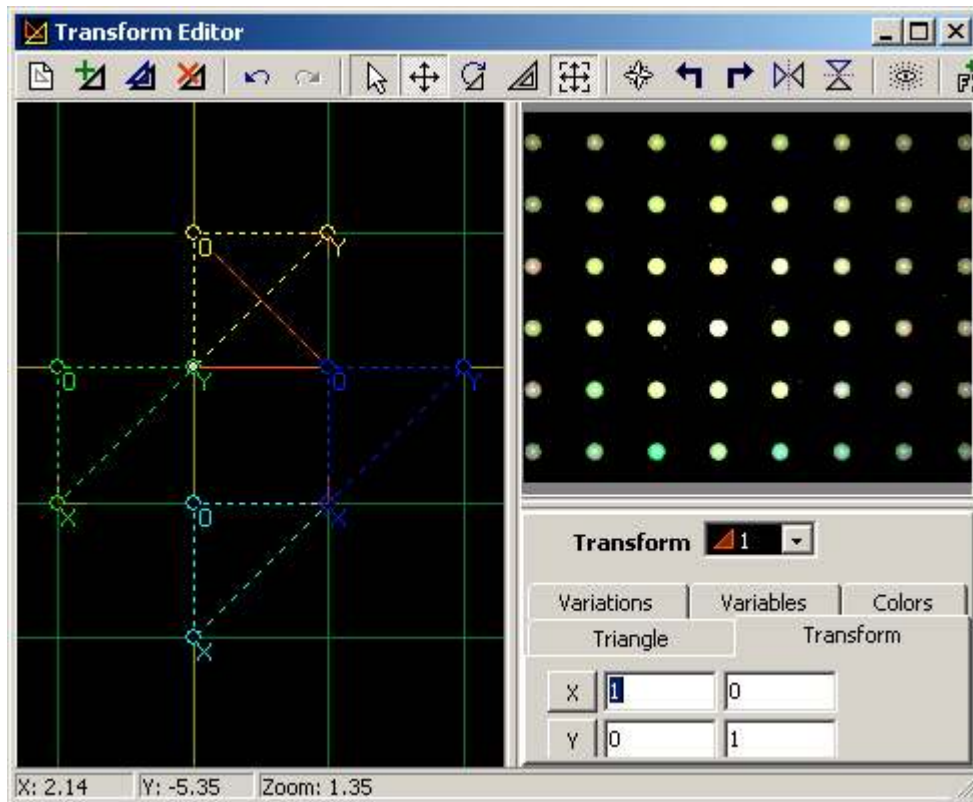
9.Move it 1 unit left:



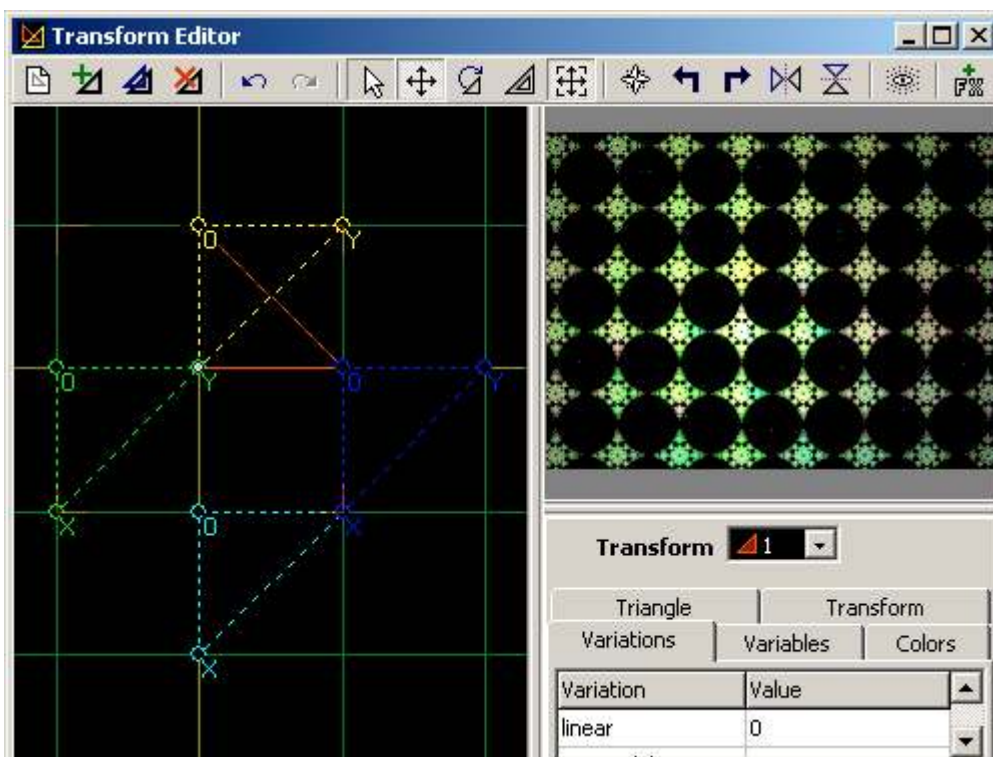
10. Repeat, copying this one and moving it until it is 1 unit below the origin

11. Finally copy another one and place it 1 unit right of centre:

You may also prefer to continue after step 9 and skip 10 and 11. That may work too.



Now we have set up the transforms for a basic square tile pattern. To see how effective this knowledge is, change the blur in transform 1 to spherical. Enter a value of 0.25 to see the immediate effect. You would normally start at 1 and reduce it until the image sharpens up, as I did but for this exercise we need fast results ☺

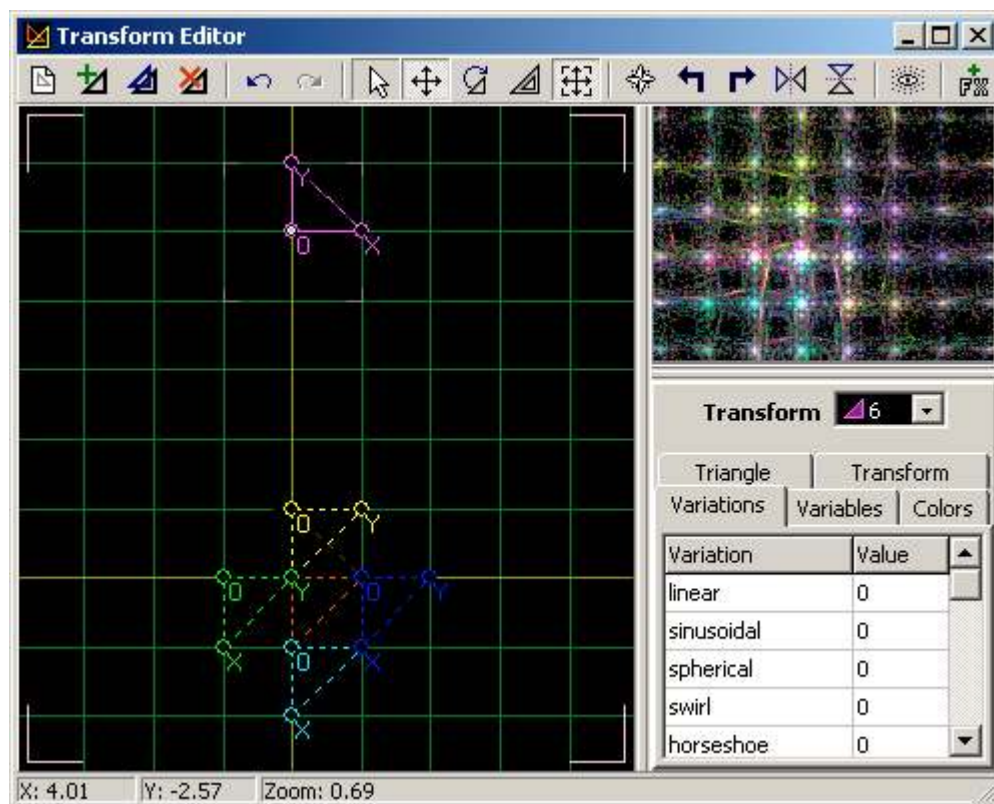


Now the tricky bit – filling in the holes. A lot of this will be trial and error. Finding the right variation of combination of variations the work. Some variation(s) that you may not normally use just might come in handy now.

12. Add Transform. Set polar=1 and linear=0

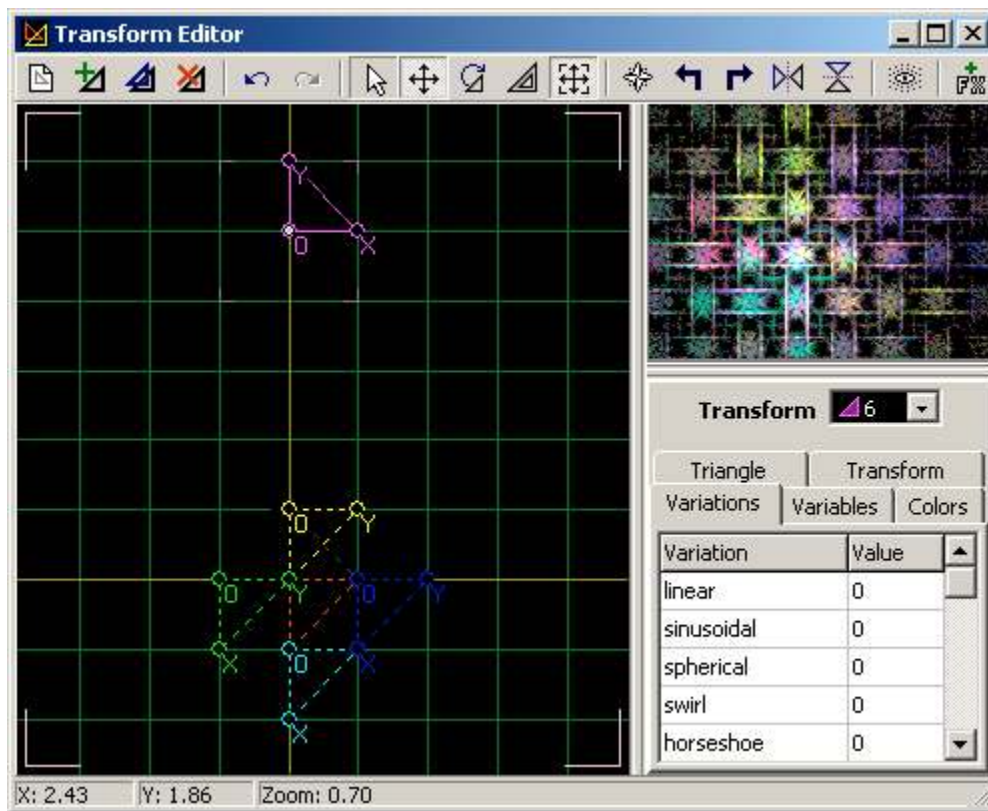
Now if you try the usual methods to try sharpening things up (play with variations or scale the transform) you will see none of these have no great beneficial effect. We haven't tried moving the triangle so we will do that now.

13. Start moving the triangle up in steps of 1 unit. Immediately you will notice the images starts to sharpen – so lets keep going! Move it a total of 5 units. After this there doesn't appear to be a lot of change in the sharpness and it is still far from perfect:



So what do we do now? Well we go back and try our other methods of playing with the variation and/or scaling the transform.

14. If you try both these I think you will find reducing the amount of polar variation to have the better effect. To get a reasonable start I settled on a value of 0.25:



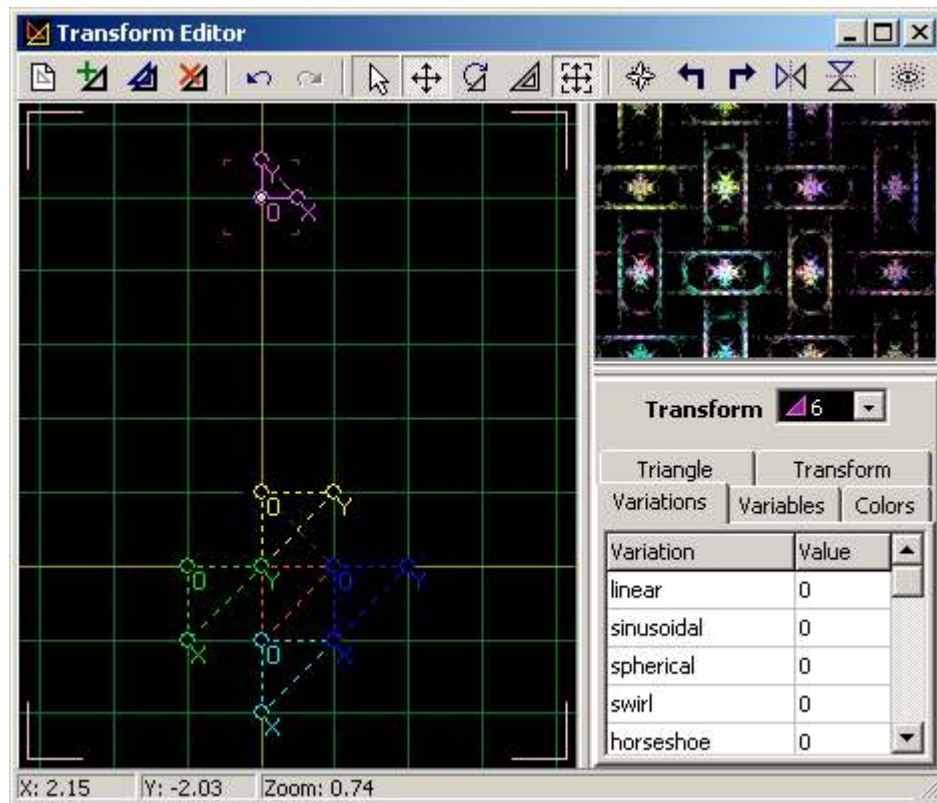
Now this still needs tidying up a bit because of the 'loopy' bits ☺ We know that the polar variation hasn't caused them so that must be down to the only other transform in the flame that is not involved in the tiling, transform 1. So let's play with the variations already set there to see if we can tidy this up. You might also find it useful at this point to increase the Master Scale to zoom in a bit more. I increased it to 40.

15. Decrease the spherical variation in transform 1 until the loops are inside the horizontal/vertical bands. On mine a value of 0.116 about does it.

You can also see that when you zoom in, the edges of the bands aren't quite sharp enough so we can go back to the triangle with polar and tweak it further, the way we did before, until it looks better.

16. Select transform 6 (polar one). Adjusting the variation just messes up the work we did with the last step, so scale the transform down until you get a nice reasonably sharp edge (screenshot at top of the next page):

Now I know this hasn't exactly filled the gaps but it *has* reduced them and with the added effect of creating a weave (I'm sure this alone will start you thinking of possibilities ☺). So we still need to try and fill the gaps a bit more so let's add another transform.



17. Add transform. Set spherical = 1 and linear= 0

Whilst you can see the gaps are filled, the pattern isn't defined well enough to be used. Now comes another tricky bit ☺

18. Move the triangle left in four 1 unit steps.

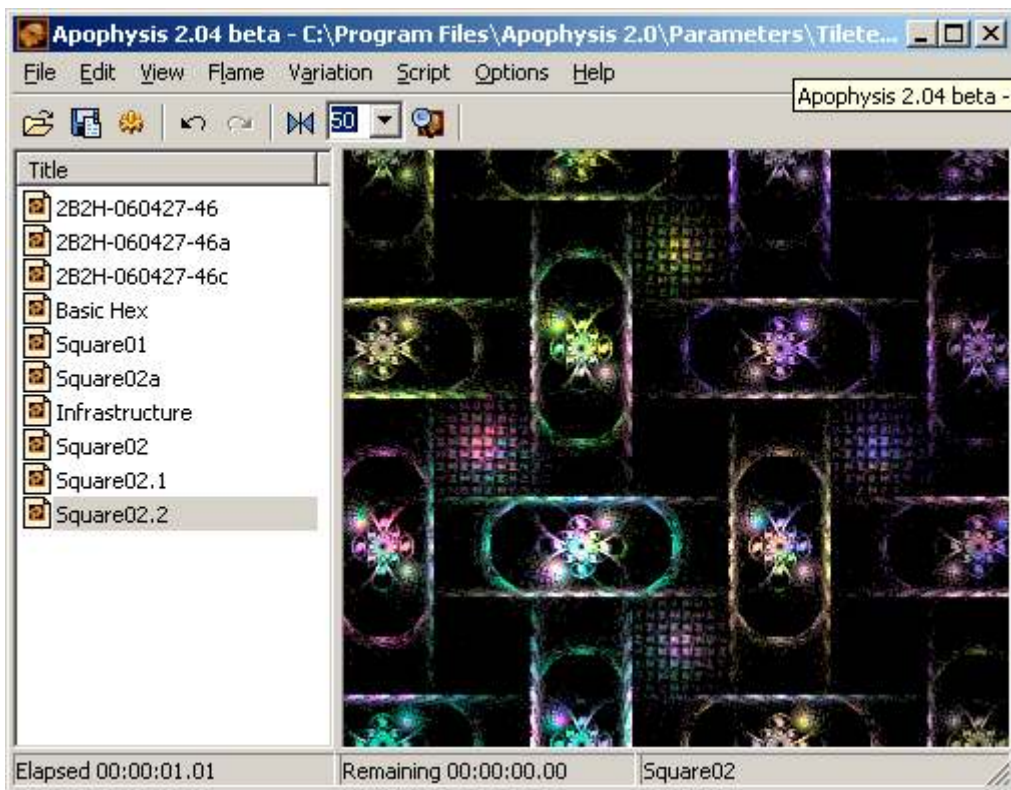
19. Now move it down in 1 unit steps but watch the preview as you do so. You will see part of the flame migrate towards one of the blank areas. Keep moving it until it appears central in these areas. This should be at 4 moves. This shouldn't be surprising as we moved away from the centre 4 units.

21. OK, now we need to reduce this new pattern so it fits neatly into the square. Scaling down the triangle works nicely. Screenshot next page

Now you have a choice. You can either leave it at that or fill the remaining 'holes'. I'll show you how to do the latter so you know. What may surprise you is how simple it is.

22. With transform 7 selected (the last one we added and worked with). Press the Insert key. This duplicates the selected transform.

23. Press the space bar to set the pivot to world pivot (rotates about 0,0)

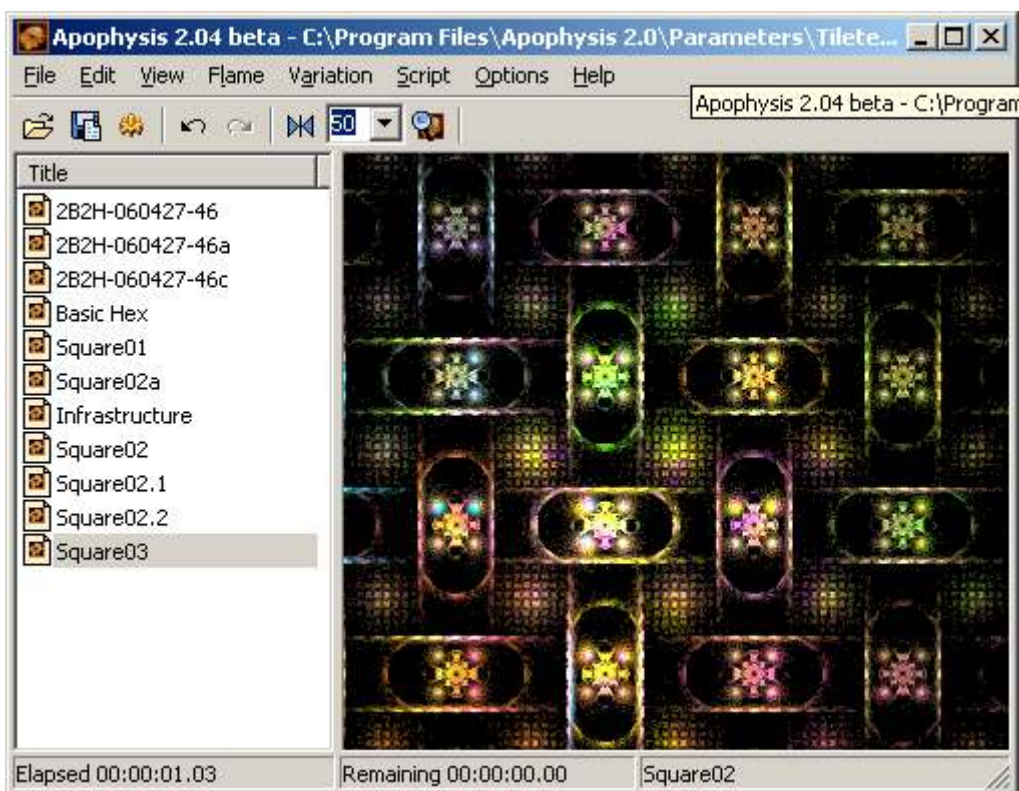


Screenshot after step 21

24. Rotate 90 degrees (any direction).

That's it! How simple was that? ☺

Now all that's left is to adjust the zoom. I set the Master scale to 30 to give a good representation of the pattern:



There is a downside to this I have still to fathom out and that is colouring. Some tiled flames are easier to colour than others. This one retains the metallic look no matter how I try so I have decided not to tweak the gradient any more. Here is the parameter file:

```
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0.49300675417652" scale="74.3283582089552" oversample="2" filter="0.5" quality="50"
background="0 0 0" brightness="16.7521739130435" gamma="3.3" >
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</flame>
```

It's on tiled images like this that the Final Xform excels. Try adding the Final Transform with a **juliascope** setting of 1 and **juliascope_power=2** then increase the **juliascope_dist** to close up the hole in the middle.

Enjoy ☺

Remember when trying for other tiling patterns (hex etc), first rotate the 'tiling' transforms (the ones with linear=1) so the pattern matches the tiling you want. Then place them so the pattern repeats cleanly. In the case of the square, they are placed in a square. This won't be the same setup for the hex or other types. You may also find you don't need as many 'tiling' transforms as you think (remember we filled the blank areas with only two transforms).

Hopefully this will open up some new areas for you. I am still learning this aspect and I have gleaned much on my way and with some guidance. I now think it is within my grasp.

Use of blur

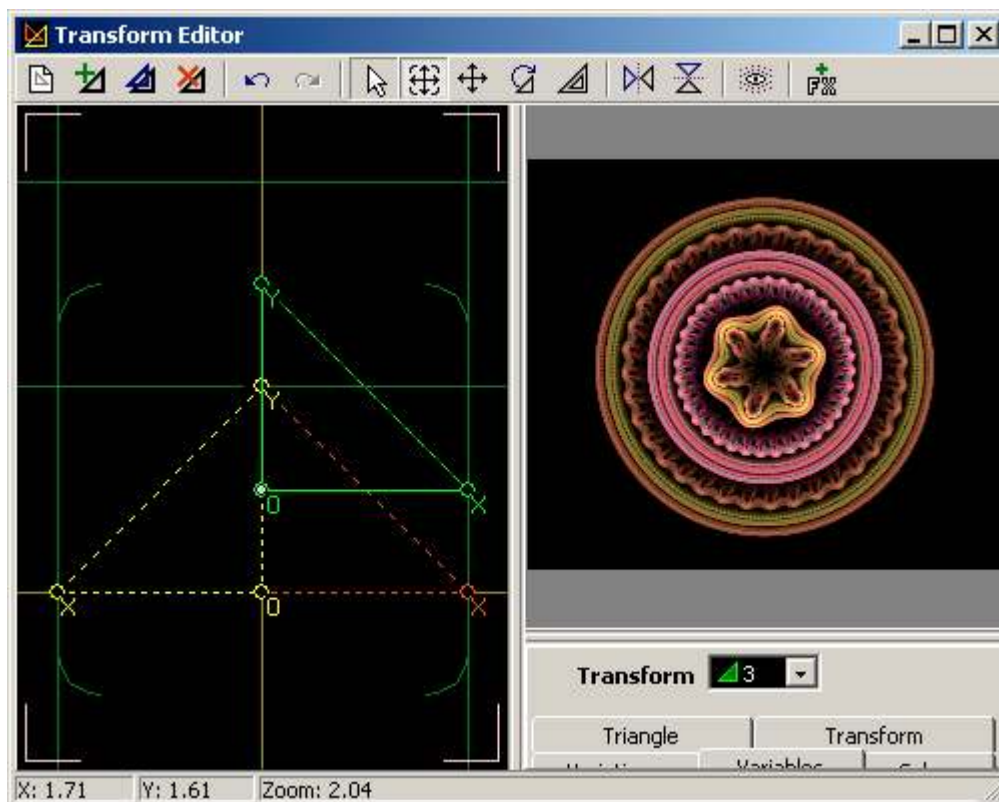
Zueuk, Grinagog and Psion005 have used this variation to create some extraordinary flames. They look solid as though constructed from metal or plastic.

The way I have found a use for blur is to use it in a triangle on its own with no other variations. Lets create an example and fall back to our friend julian.

Step by step.

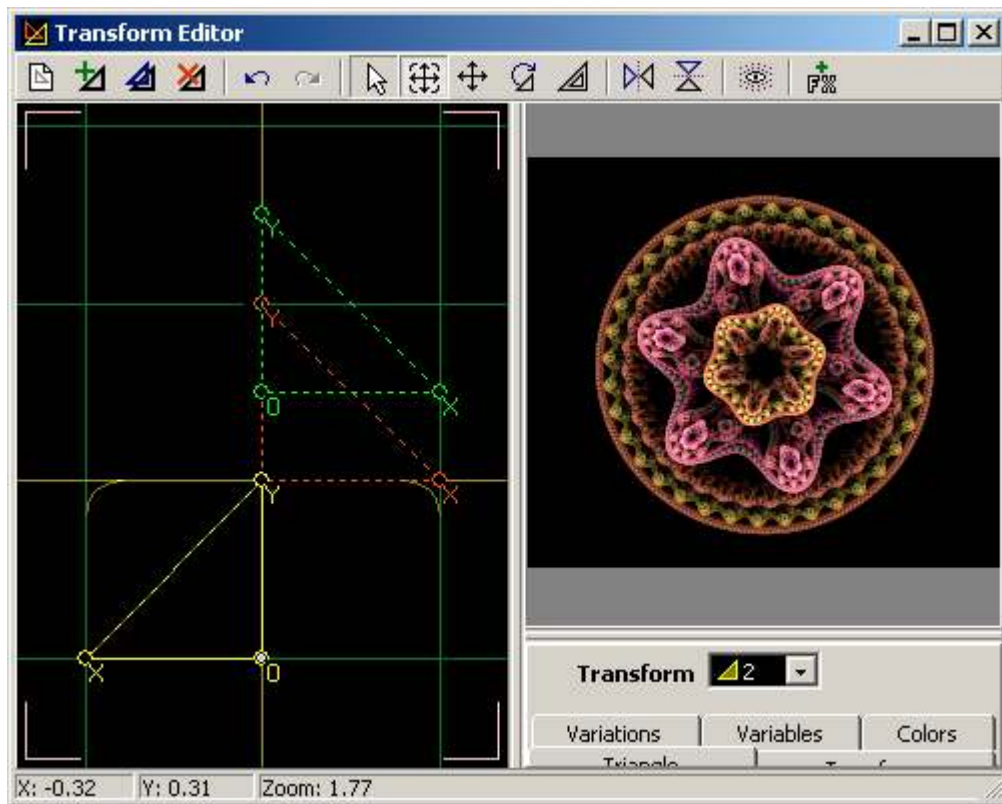
1. Create a New Blank Flame
2. Remove the linear variation from both and set julian to 1.5 on triangle 1 and 1 on triangle 2. Flip one horizontally if you prefer
3. Add another triangle, set linear to 0 and julian to 0.5 and move it up 0.5 units
4. Now go to the **variables** tab and make the following changes
 - a) triangle 3: Julian Power = 6, julian dist = 1
 - b) triangle 2: julian power = 4, julian dist = 1.5
 - c) triangle 1: julian Power = 6, julian dist = 1.5

Again depending on gradient, you should get something like this:

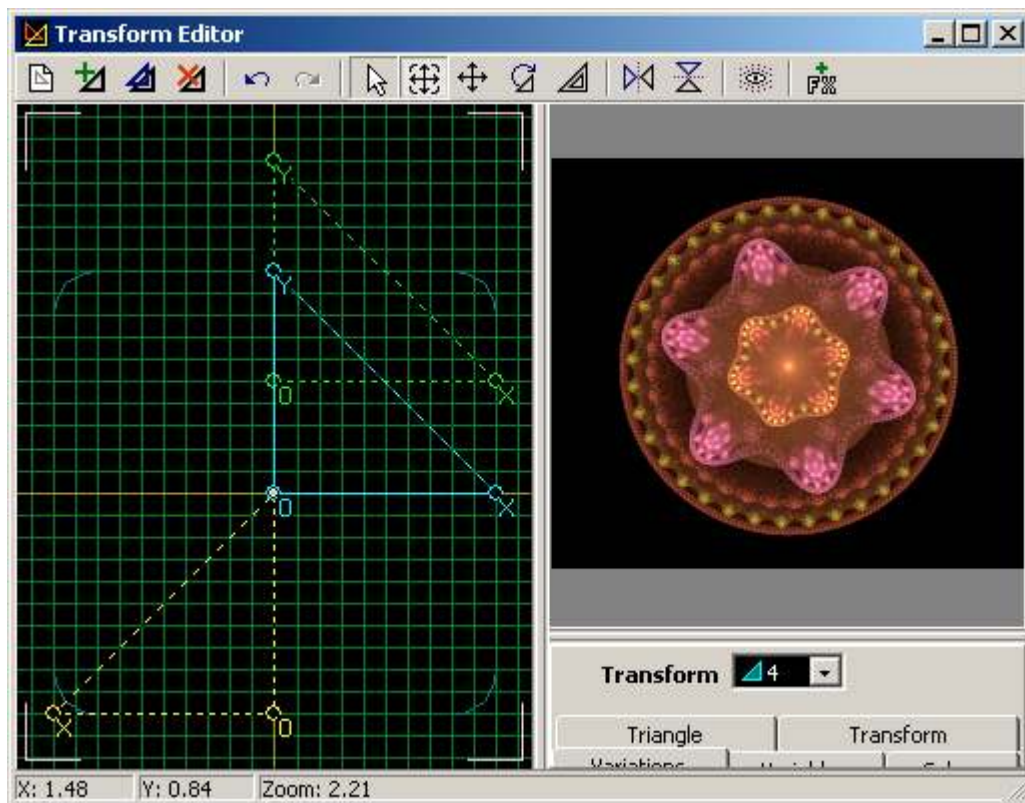


Ok now we need something for our blur to work on.

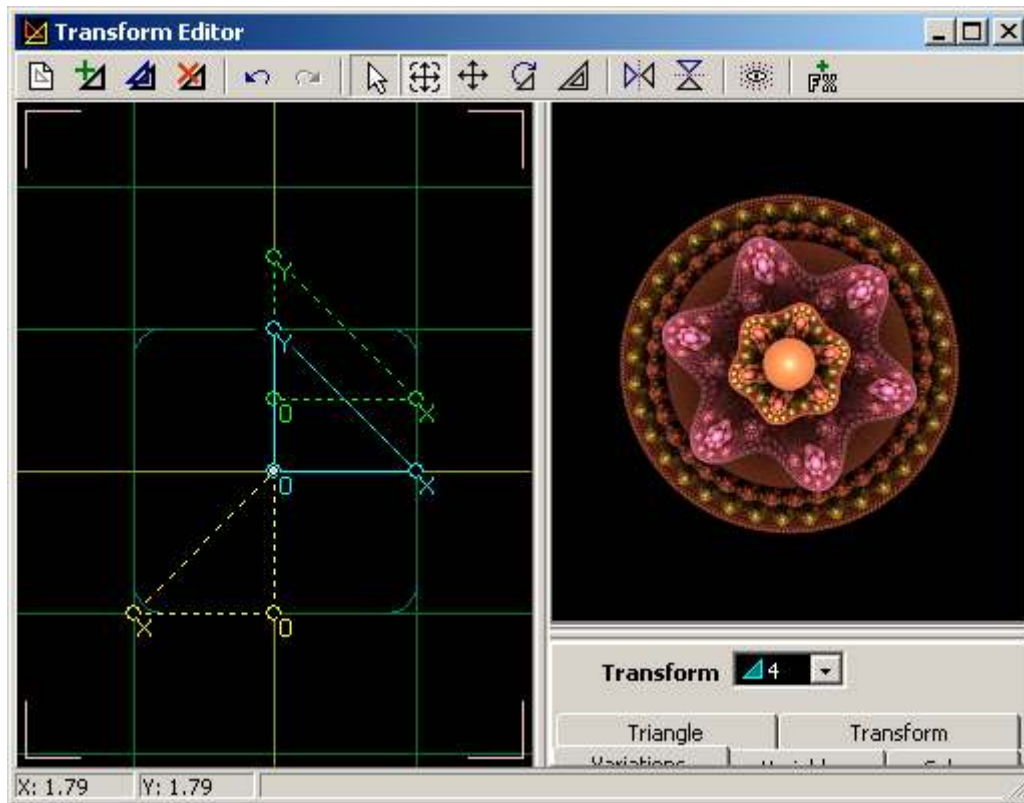
5. Move triangle 2 down 1 unit:



6. Add another triangle, set linear to 0 and blur to 1 (screenshot on next page). Now the image looks fuzzy so we need to reduce the amount of blur to sharpen it.



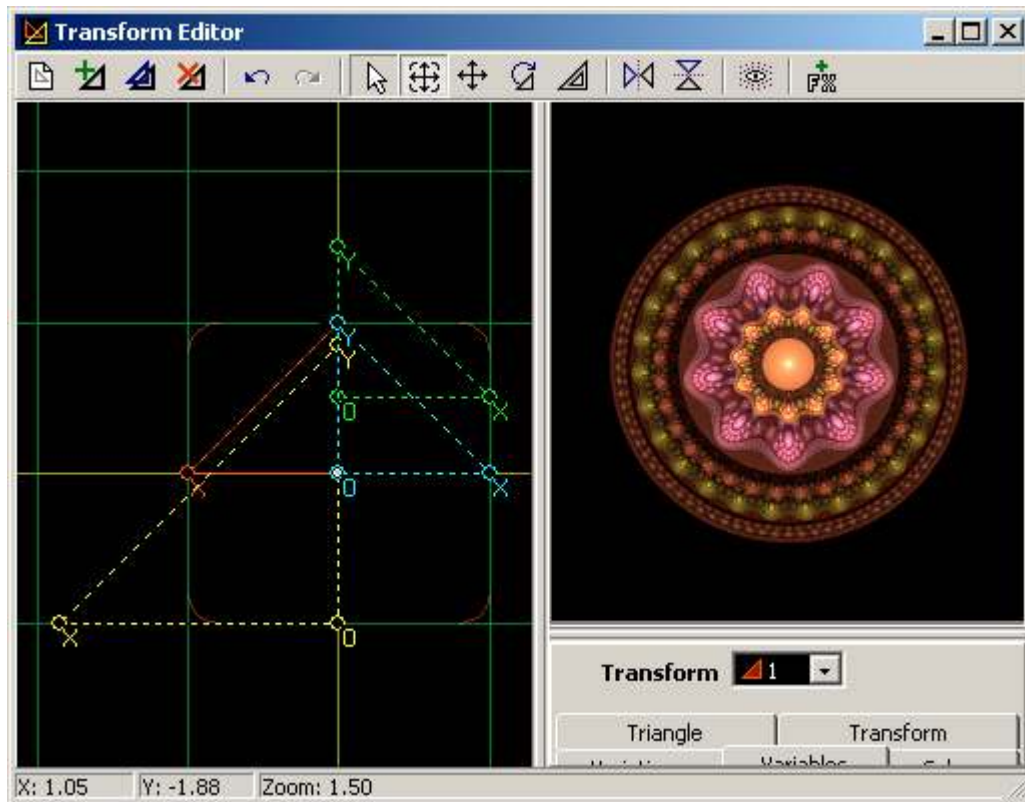
7. Reduce the blur to 0.25. This is what I now get:



Now this is quite cool but I think some improvements can be made. To finish make the following changes:

8. Triangle 1: julian power change to 3, julian dist to 0.75
9. triangle 2: julian variation change to 0.75, julian power to 9 and julian dist to 2
10. triangle 3: julian power to 11, julian distance to 2

The final image is shown on the next page

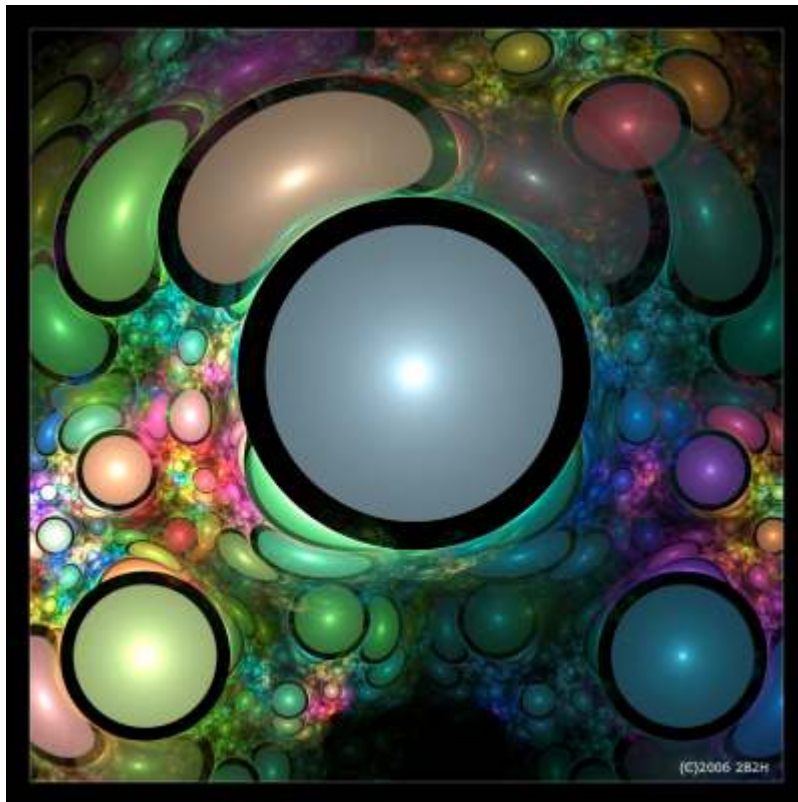


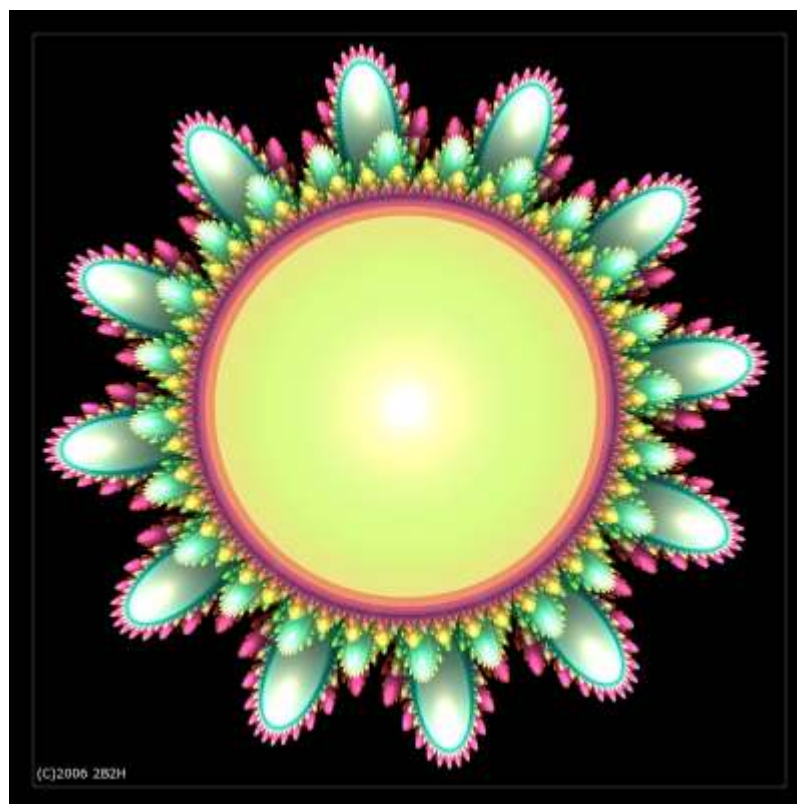
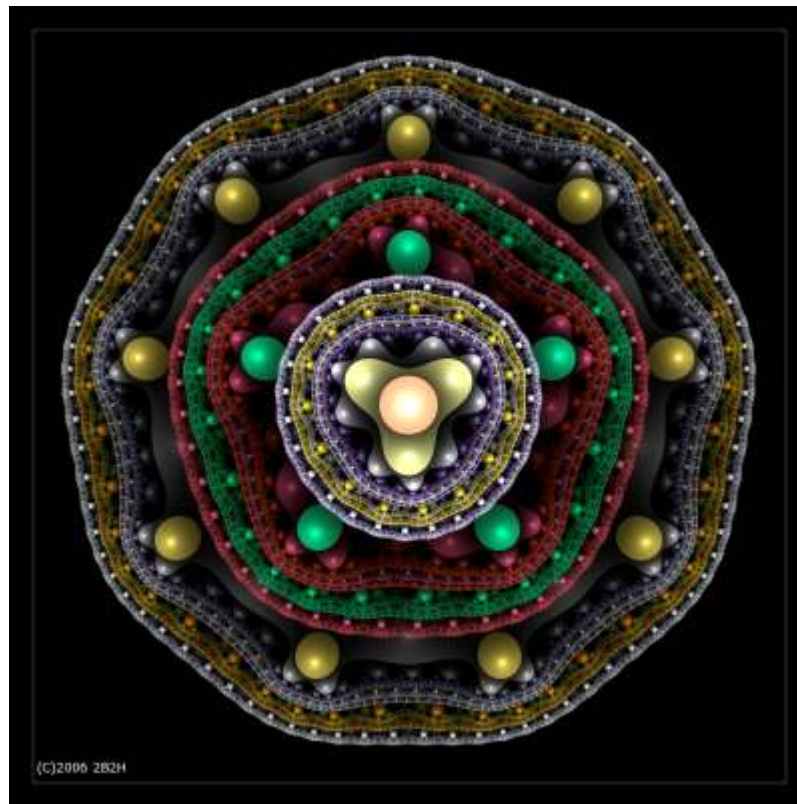
Here is the parameter file:

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background="0 0 0" brightness="5" gamma="3" >
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julian_dist="0.75" />
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julian_dist="2" />
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00F6463A00F1342900EB302D00E7263500E8185400EC206900E7268600ED3689
00E23A8E00E9348C00D4289F00D912A800D00CA900D50FA200E2199600E82F87
00E93E8200C14D75009A495A005A4742002E3D390016312C000A3B3A001B473C
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</flame>
```

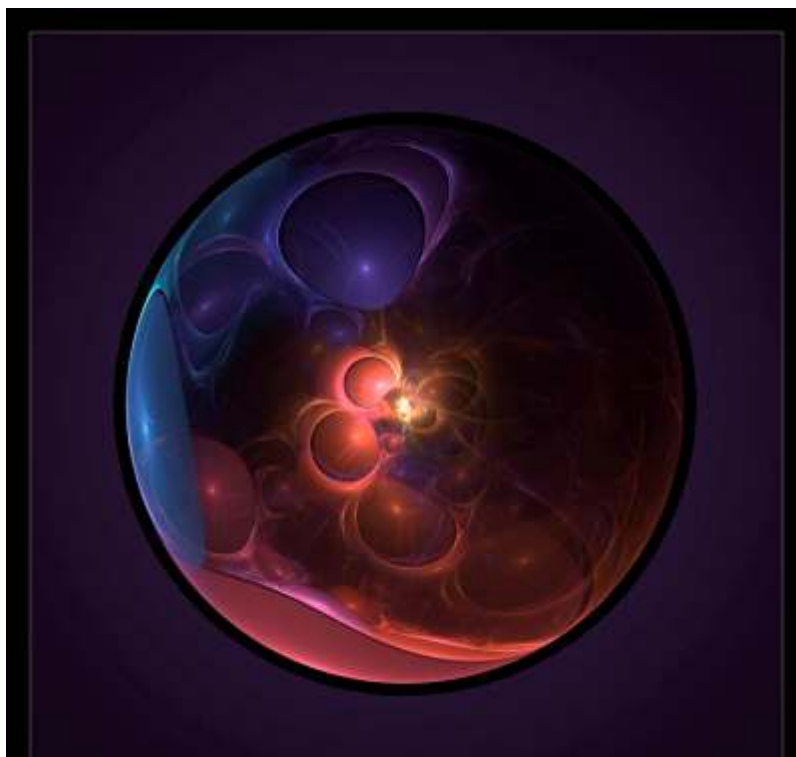
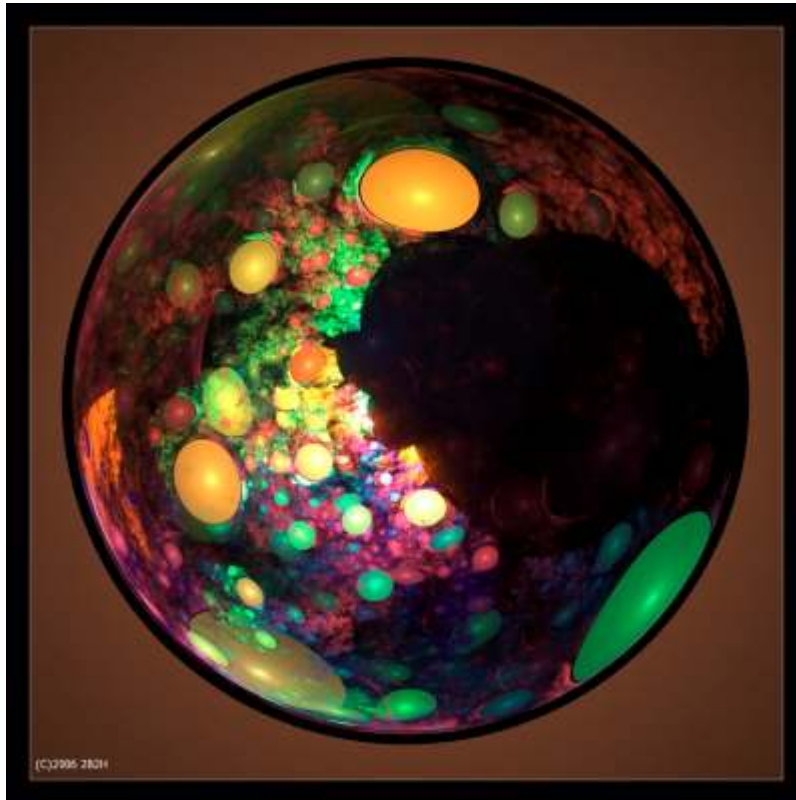
What blur does is fill the 'holes' to give the appearance of spheres and 'solidify' the flame. A few examples using this technique can be seen below and on the next page. 'Wild Thing', one of my more colourful flames was created using this technique, but using the spherical variation instead of Julian:

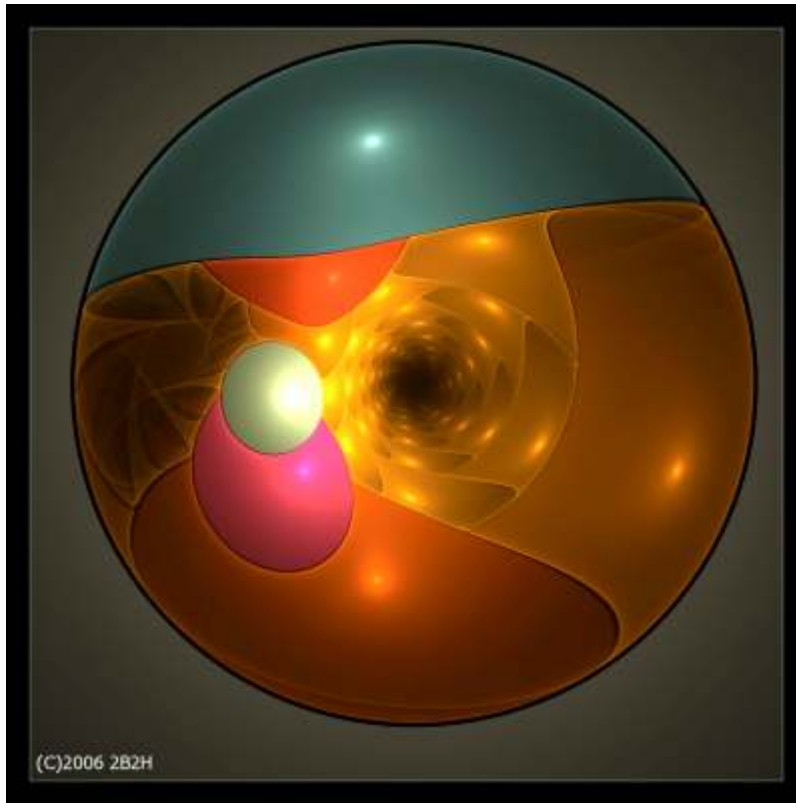




Dragon Eggs

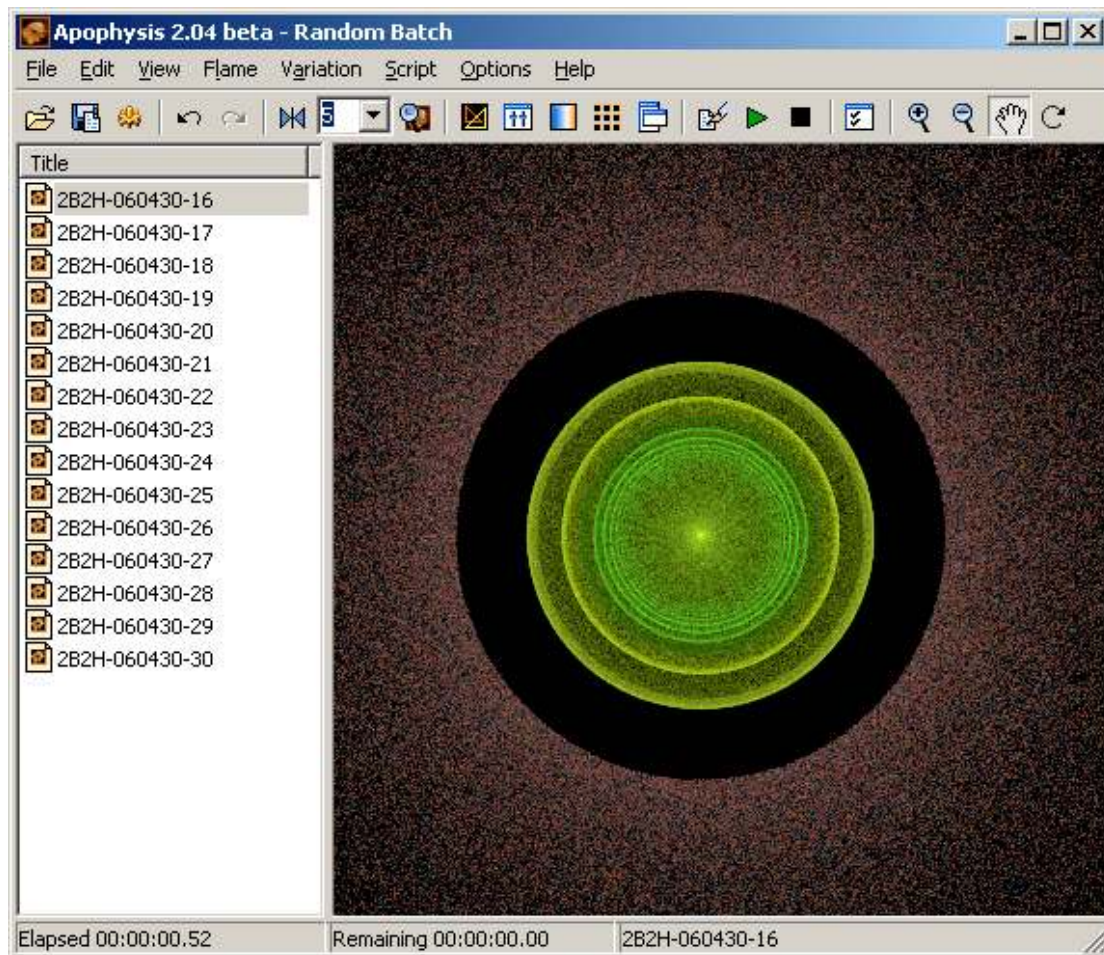
Whilst scouting around the new Apophysis Wiki tutorial section (<http://apophysis.wikispaces.com/Tutorials>) I came across a link to creating Dragon Eggs by Darv Atkeson. I hadn't really come across the term before so I took a look. I immediately realised some of the stuff I had been doing were of similar design, althou constructed in a completely different way. First let me show you some examples:





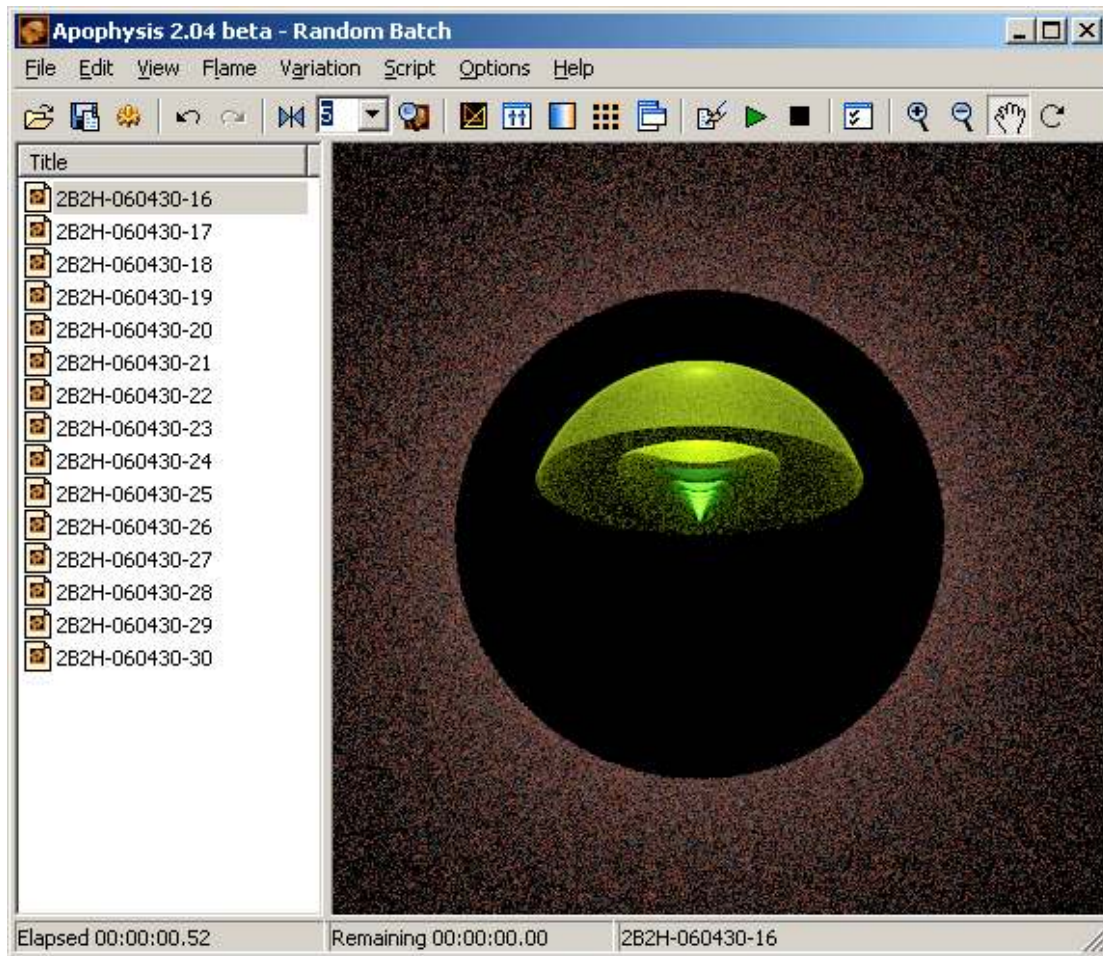
Now lets make some!

1. New Blank Flame
2. Set the linear and spherical variations in Transform 2 to 1 and 0.5 respectively
3. Set blur **only** in Transform 1 to 1. I usually rotate the blur transform out of the way
4. Add Final Transform with a setting of Spherical = 1 (remove the linear variation). Use the F12 key to get a better view. Here's what we have (your will be probably be coloured differently):



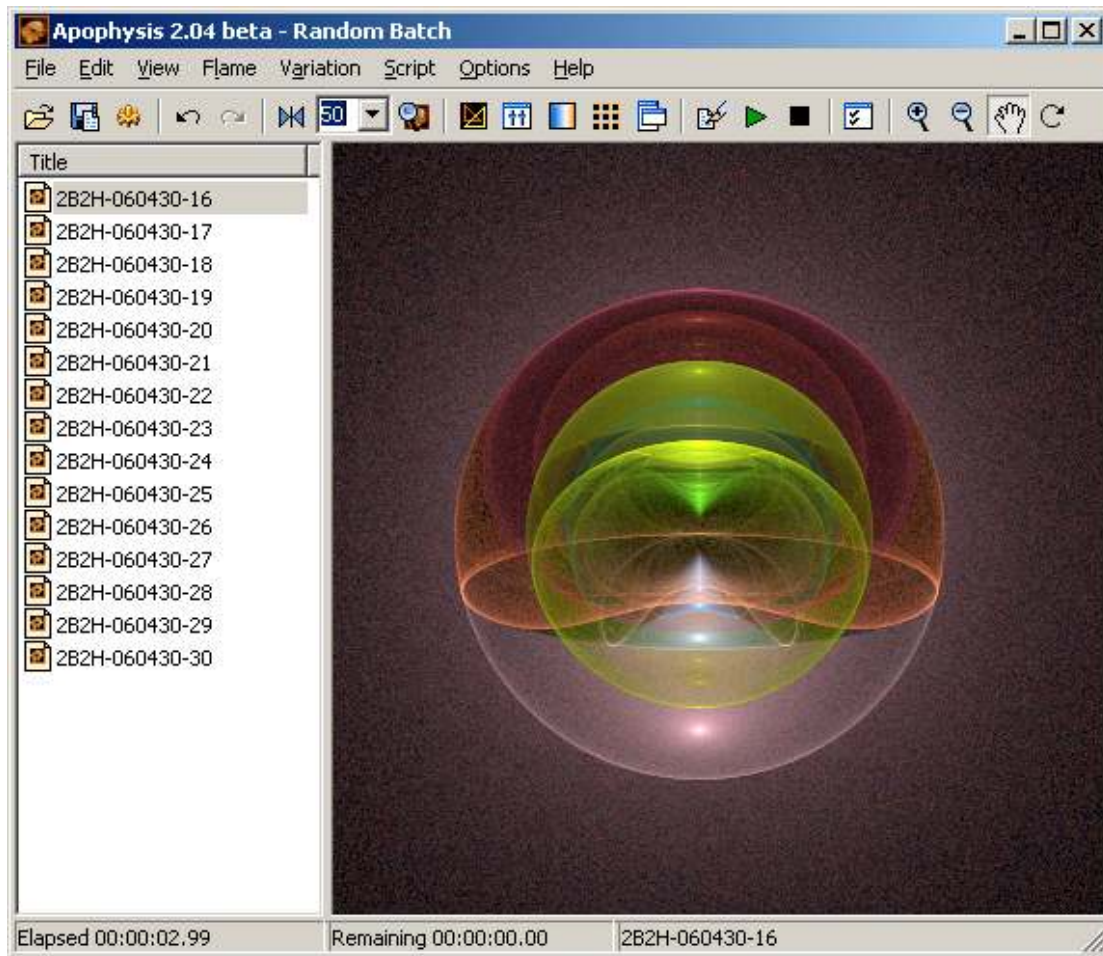
Already you can see the surround is filled in ☺ Now lets add some interest.

5. Select Transform 2 and move it away from the centre. I moved mine 1 whole unit up. This is what I now have:

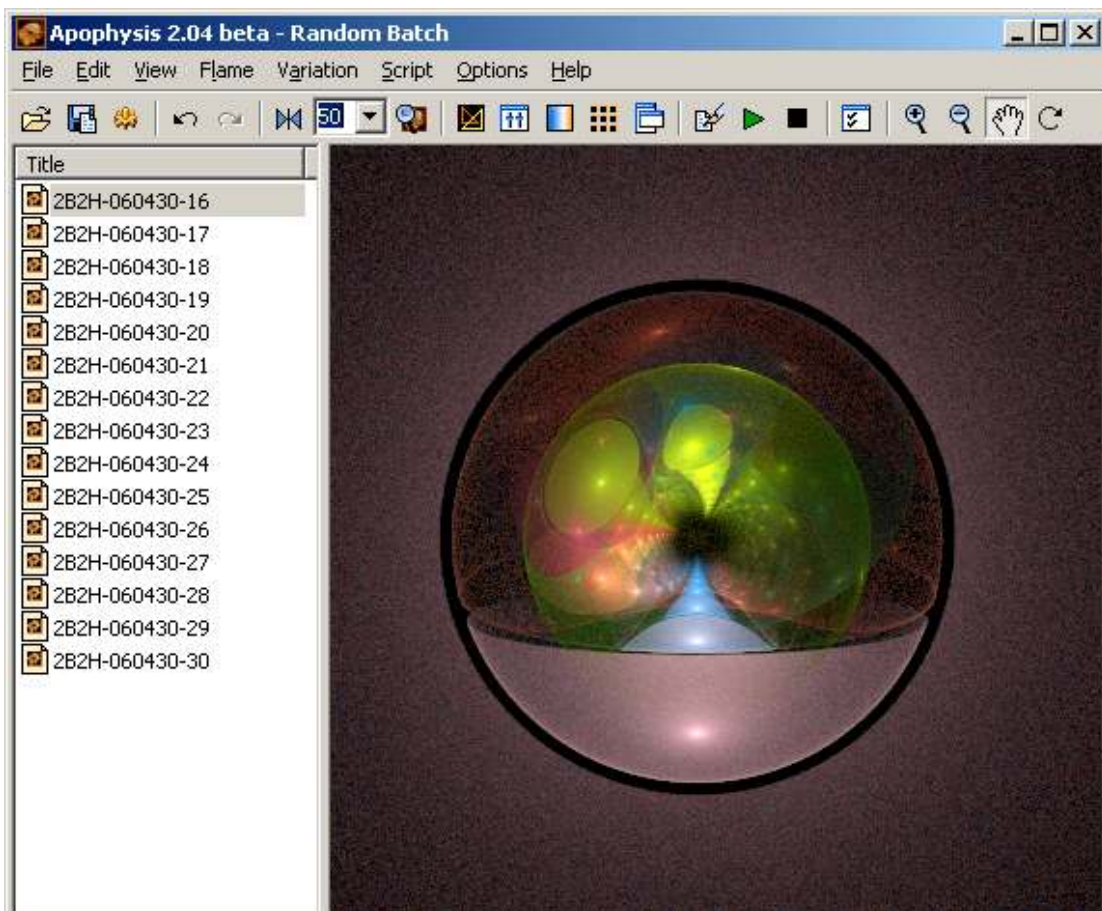


6. Add another transform and set spherical to 0.25 (keep the linear as it is for now)
7. Move this one 1 unit down. This is what we have (image on next page). You can already see how this is taking shape. However you will see that the defining black border has disappeared. Don't worry. To get it back *decrease* the amount of blur used in transform 1. Until we are done with creating the actual inside of the egg I suggest making the black border nice and wide. This way you will easily see if any tweaking causes the flame to encroach this area, which will have a detrimental affect.

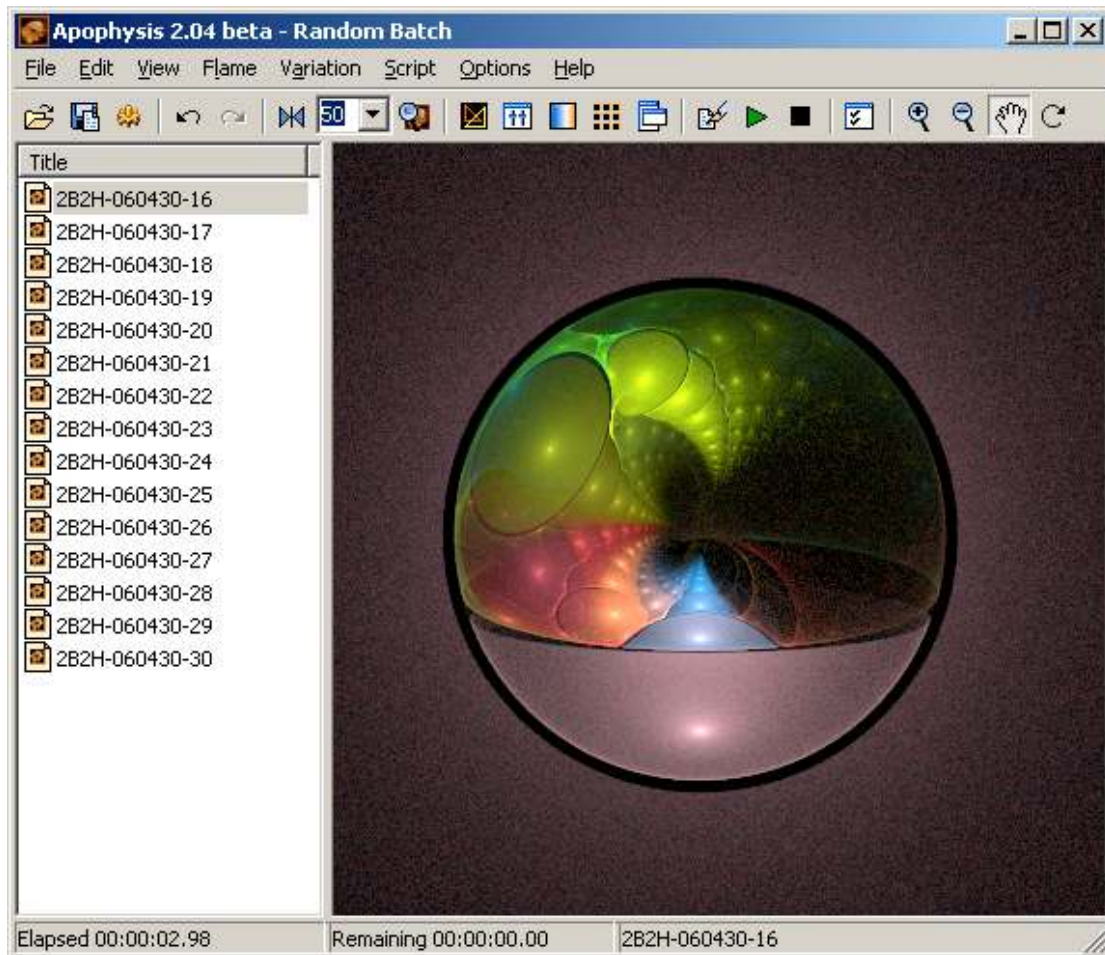
We have sufficient here to play around with to get a good flame. All you need to do now is play with the transforms. You can obviously add more if you want to. For the moment I have used what we have. The important thing is that spherical variation must be present in all transforms.



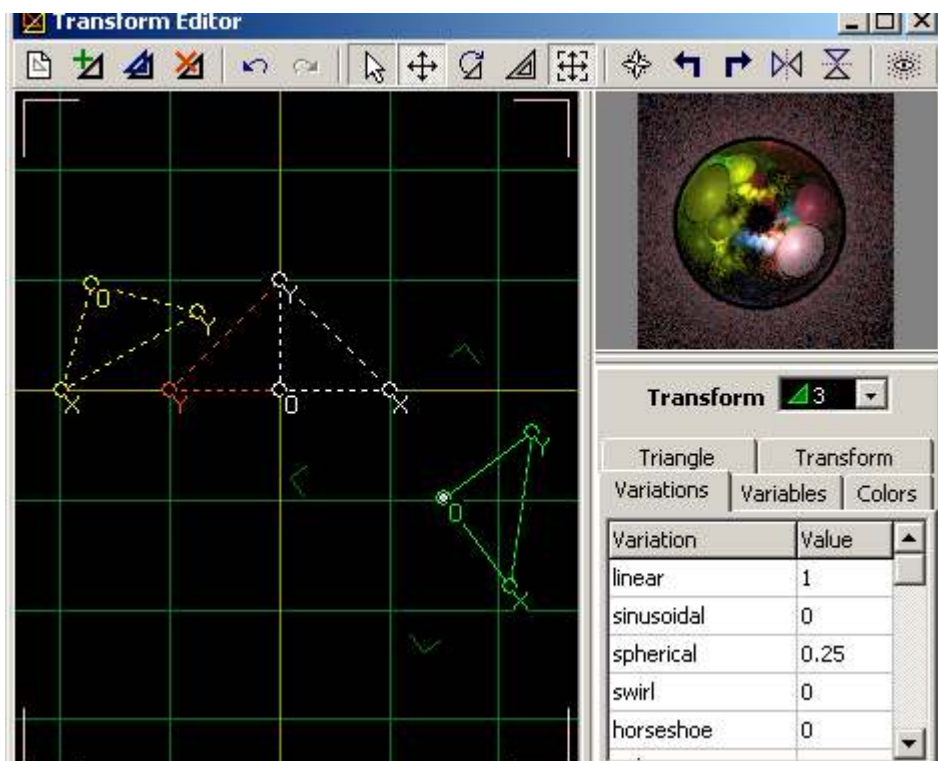
8. I moved transform 2 and rotated it:



9. Now this 'inner' sphere may not be what you want. To get rid of it just manipulate the variations – in this case reducing the spherical and linear did the trick. Reducing the linear makes the 'blobs' more dense.:



- 10 To remove the split at the bottom, play with transform 3. Here is a screenshot of the transform position now:



Now it's just a question of colouring to taste. One useful snippet is that the colour of the surrounding area is dictated by the transform using blur, so this makes it easy to frame the egg as you want. Once you are happy, adjust the amount of blur to leave a narrow border around the egg and that's it. Sit back and wait for it to hatch ☺

Actually that isn't quite it. There is one more little surprise for you ☺ I won't tell you what it is other than two actions:

1. Remove the effect of the Final Transform
2. Hit the F12 key. Enjoy ☺

Here is the param file:

```
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0 0" brightness="5" gamma="3" >
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  <xform weight="0.5" color="0.317" linear="0.618" spherical="0.402" coefs="-0.266017 0.963968 -
0.963968 -0.266017 -1.711805 -0.971149" />
  <xform weight="0.5" color="0" linear="1" spherical="0.25" coefs="0.608554 0.793512 -0.793512
0.608554 1.500234 0.990383" />
  <finalxform color="0" symmetry="1" spherical="1" coefs="1 0 0 1 0 0" />
  <colors count="256"
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</flame>
```

[illegible]

1. Increase blur to 1. This will enable the background to have 'body' and help with the black border around the egg. You will see the edge of the egg is not yet sharply defined so we need to play with the variations.
2. Transform 2. Play with the variations and watch the effect in the preview. You want the edge to sharpen up. Two way of doing this - increase linear or increase


```
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scale="198.094117647059" oversample="2" filter="0.5" quality="50" background="0 0 0"  
brightness="9.5695652173913" gamma="1.5" >  
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0.443405 -1 -1">/>  
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0.443405 1 1">/>  
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0.323524 -1.207407 0 -1">/>  
  <finalxform color="0" symmetry="1" spherical="1" coefs="1.25 0 0 1.25 0 0">/>  
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0056000000711D0000770100007E000000640000004A000000520000005C0000  
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```

```
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0087100000A00000008600000082000000710000005E00000049000000620000
```

8. Now this looks OK but the blobs look a little hazy. As we know, transform 1 controls the blobs so lets increase the weight to see the effect. In the transform tab of the editor window, set the weight to 1.5. The recurring egg is an interesting effect caused by transform 4 being at the middle. I've called this the Infinity Egg :) This is the result:

I would like to thank Helen for her permission to include the above in this document.

Here are the before and After renderings :)

Before:



After:

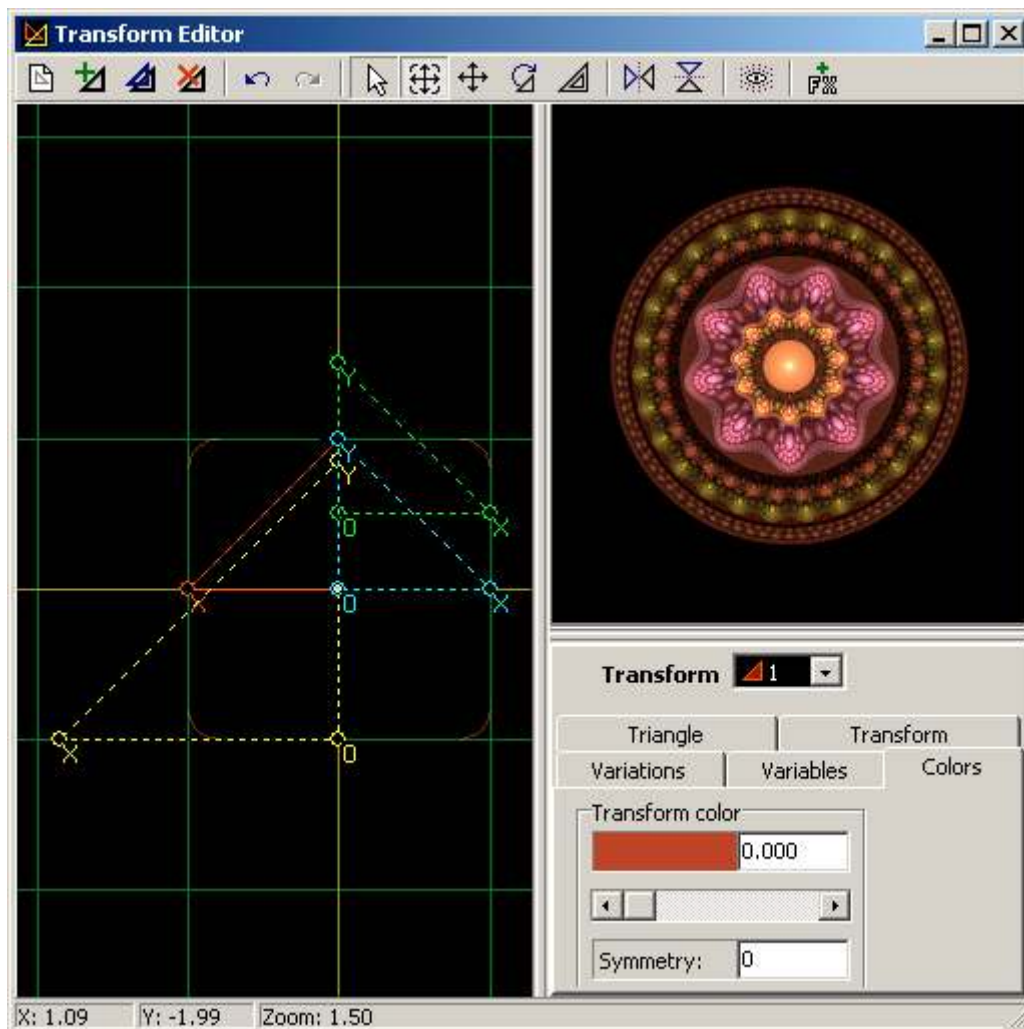


Adding Colour to your flames

There are two ways you can do this. The first is simply to use the **Flame** menu and select **Calculate Color Values**

The second method is the one I tend to use now and I will describe this next. Before I do so, if you have had problems colouring flames in previous versions (particularly 2.03c) you should find it much easier in this latest version. The reason is this. When you used AddTransform (either via script or the toolbar) when a transform was added *it also included a symmetry value of 1 by default* (except for the first two transforms when the New Blank Flame button was used) This was only discovered during beta testing of 2.04 and fixed so if you want to go and tweak your old flame colours, check the symmetry values first ☺

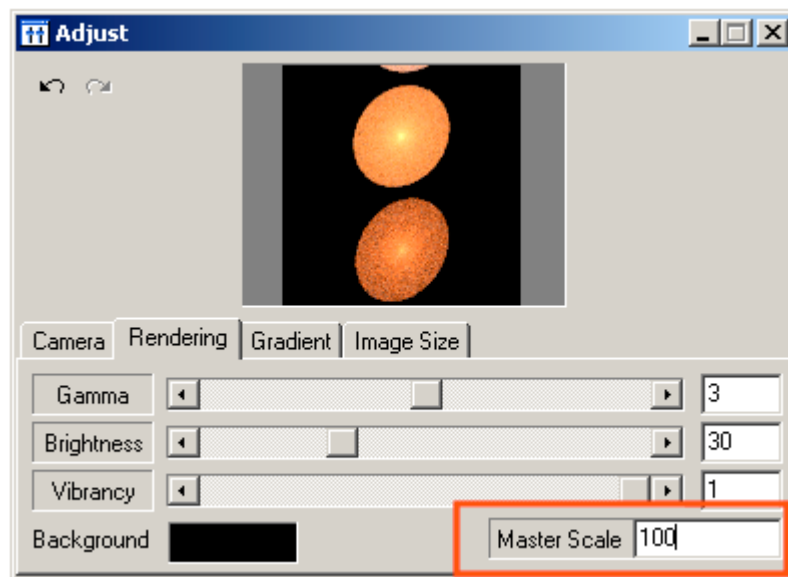
Ok onto tweaking colours. Another confession. Up until using this version I was content using the menu option mentioned in the previous paragraph. Now I rarely use it. For this exercise we will use the **Colors** tab in the editor:



This method is very simple but extremely effective. Using the method of changing variables described in **Tip No. 2** back in the section **Working with the Editor**, place the cursor over the section filled with colour and hold the left mouse button down and drag left or right. The value will change in the same way as it does for variations but the important things are you can finely adjust colours very easily **and** see the influence on the flame. This allows you to make very subtle changes which can make all the difference. It's as simple as that. No magic tricks and probably one of the more important things I can teach you about, assuming you weren't already aware 😊

Tip No. 4

Don't use the zoom icon in the main window. It is MUCH faster to use the Master Scale in the Adjust Window:



Another important consideration when colouring flames is their weights. You can find the weight set for each transform on the **transform** tab. The higher the weight the more that transform will influence the colouring. If you set them all to say 0.5, none of the transforms will dominate the colouring. By playing with the weights you can sometimes even out the brightness in a flame so a darker area will show more detail. The highest value you can have for weight on one transform is 100. Using such high values completely alters the appearance of the flame. Even modest adjustments can add that 'something'. For instance when you are using blur, try changing the weight value. This will help add denseness to the 'blobs'.

Using these methods it is quite easy to achieve vibrant flames if that is what you want. In addition it is also much easier to control the colouring to achieve more subtle effects. Colouring is what gives the flame life and is extremely

important. Make sure your gradient has plenty of colour (no or very few blacks unless that is an effect you are looking for).

Tip No.5

The use of the Final Transform has been mentioned. There is however a caveat I recently discovered. By increasing the values in the variations it seriously hampers your control over the brightness/colour of the flame. More so with variations like the julia family or spherical. For instance if you initially activate the Final Transform and you see the flame quite small in the preview window you have three options. One is to use the F12 key but this doesn't always work (and can make things worse). The second is to use the Master Scale edit field previously mentioned. The final option is to increase the value in any variation of the Final Transform. My advice is this: try not to let any values in any of the Variations fields in the Final Transform get much above 1 and if you can keep them even lower then so much the better. The lower the value the brighter your flame will be. If you do increase the values watch the preview window for loss of detail/brightness. Much better to use the Master Scale instead to zoom in.

Conclusion

That about does it. All the flames in my gallery have been created using these methods – even the solid looking ones. For the solid look, I would suggest starting with the julian and experiment using the tips I have given in the julian section. The important thing is that the blur must be used on it's own in one triangle. Once you get the hang of this try using other variations instead of julian with blur. I find this more difficult but I have had some success.

Before I finish I would advocate looking at the galleries of the following Apo artists whom I have a lot of respect for. There are others too but I want to let you have time to create your own flames as well ☺ I hope I have managed to expand your creativity just a little as this great little program has addictive qualities once you start to get creative.

Apo Artists

Zueuk (Apo artist and developer) : <http://zueuk.deviantart.com>

Psion005 (Apo artist and 2.04 beta tester): <http://psion005.deviantart.com>

Grinagog (Apo artist and 2.04 beta tester): <http://grinagog.deviantart.com>

MichaelFaber (Apo artist): <http://michaelfaber.deviantart.com>

Lastly, should anyone wish to look at my gallery of Apo artwork, it can be found at:

Myself (2B2H) (Apo artist and 2.04 beta tester): <http://2b2h.deviantart.com>
email: carl.skepper@ivy-cottage.net

Revision History

April 2006 - First published

May 2006 - Update editor and use of colour sections. Added section on creation of Dragon Eggs

12th May 2006 – Added new tutorial to Dragon Egg Section. Update Using Colour section again. Added content to Tiling section