18) The perpendiculars slices not intersecting origo

In the last article regarding cubic parameter space, we had a look at those special 2D-slices of the six perpendicular systems which intersect origo. In this article we shall have a look at some common features of the fractal patterns in the perpendiculars systems of slices not intersecting origo. NOTE: The filenames are thus constructed: ”a=0.633+0i” means that we have glided 0.633 units along the real a-axis (a_{real}) and not glided at all along the imaginary a-axis (a_{imag}) and thus the axes b_{real} and b_{imag} are plotted. In like manner "a_{real} = 0.4, b_{real} = 0" means we have glided 0.4 units along the real a-axis (a_{real}) and not glided at along the real b-axis (b_{real}) and thus the axes a_{imag} and b_{imag} are plotted. The axes have the same colors as in the previous article. However the centers of the displayed axes are NOT origo of the total four-dimensional system due to the above movements. Some more notations must be used from the ”Cubic Tutorial”:

1) That part of cubic parameter space for which both critical points have orbits those escapes to infinity is called *E-locus* (E for escape).

2) That part of cubic parameter space for which one critical point has an orbits that escapes to infinity and the other critical point has a bounded orbit, i e that belongs to either M+ or M- but not both, is called *B-locus* (I guess B stands for boundary).

3) That part of cubic parameter space for which both critical points have bounded orbits is called *C-locus* (C for connected), i e ”Cubic Connectedness Locus”. This part is the cubic analogy to the Mandelbrot set for quadratics (and is colored black in these articles).

Now a description of the features the fractal boundaries posses in these slices. The below description is not mathematical, but is solely the results of the visual studies of the images made by the author. Please study the attached images carefully since most of the information of this article is contained in these illustrations. Set the Acrobat to about 125% in order to see the illustrations clearly.

1) The Border between the E-locus and B-locus has the shape of the ordinary Mandelbrot set.

2) The Border between the B-locus and C-locus has the shape of the Julia set you would obtain if you picked up a parameter value from the corresponding spot inside the ordinary M set as the spot of the border has inside B-locus. From this border there are bridges to yet more Julia shaped components. In the center of these bridges there are copies of the ordinary quadratic Mandelbrot set. To the acupuncture points of these minibrots the Julia shaped components are attached as secondary decorations. If you zoom into a bridge near another minibrot you may have to zoom a little bit deeper due to the phenomena called ”Julia-like barriers” described in Article 12. Note that I use the term ”Julia shaped” due to the shape of these components. Of cause these components are not Julia sets, because Julia sets always resides on the dynamical plane, the z-plane. In the figure 4 (Mandel - Julia) two Julia sets

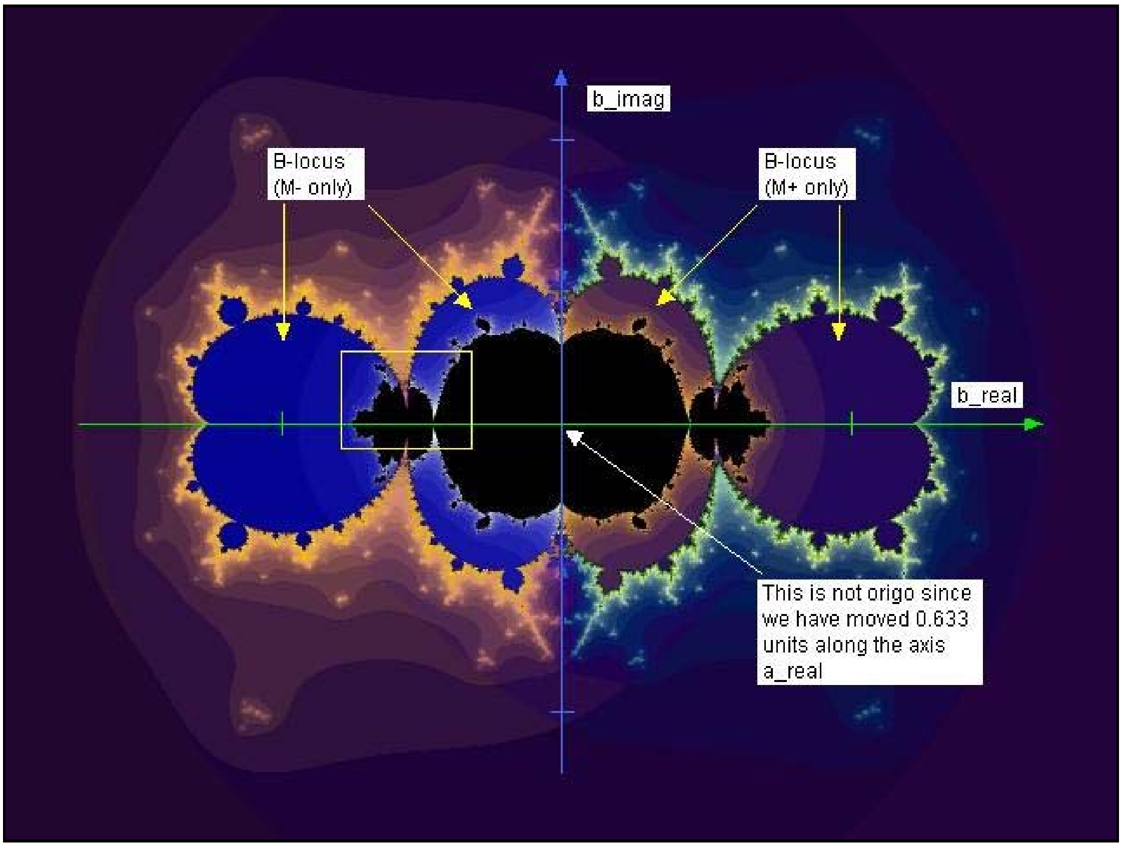

Fig 1. a=0.633+0i zoom 1.

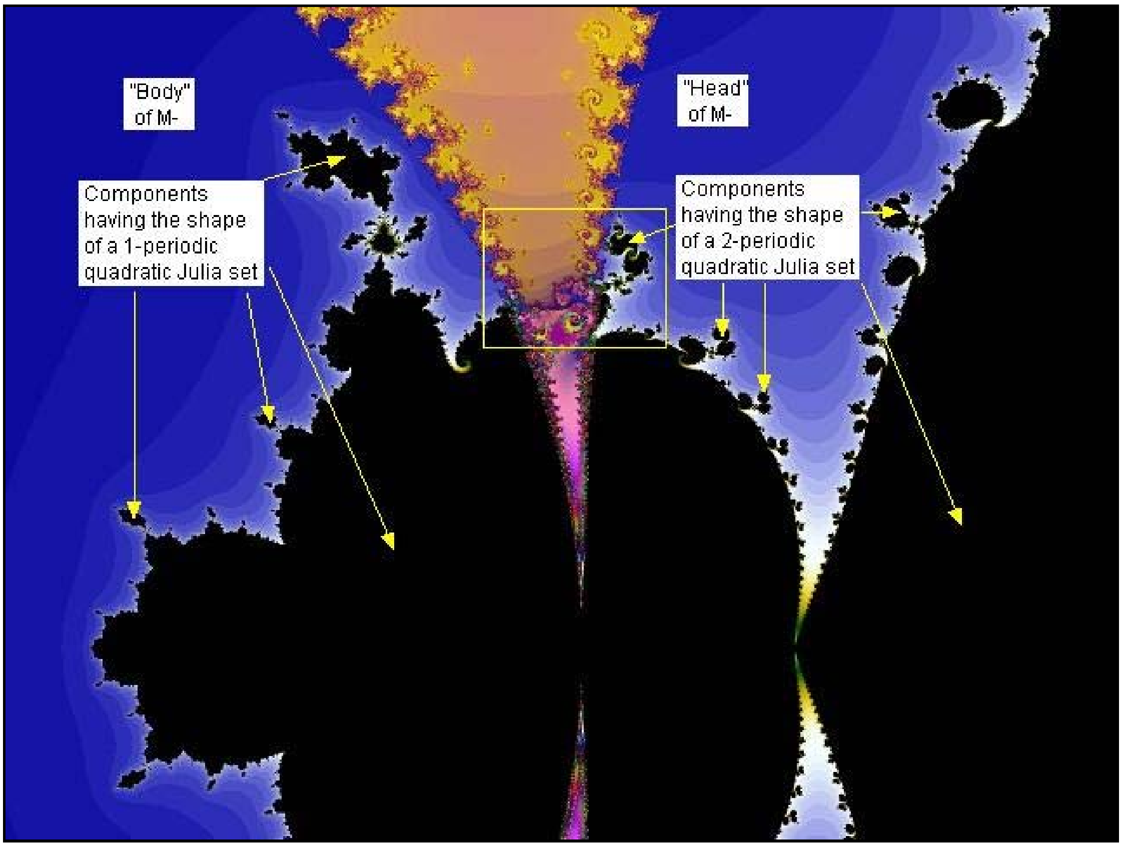

Fig 2. a=0.633+0i zoom 2.

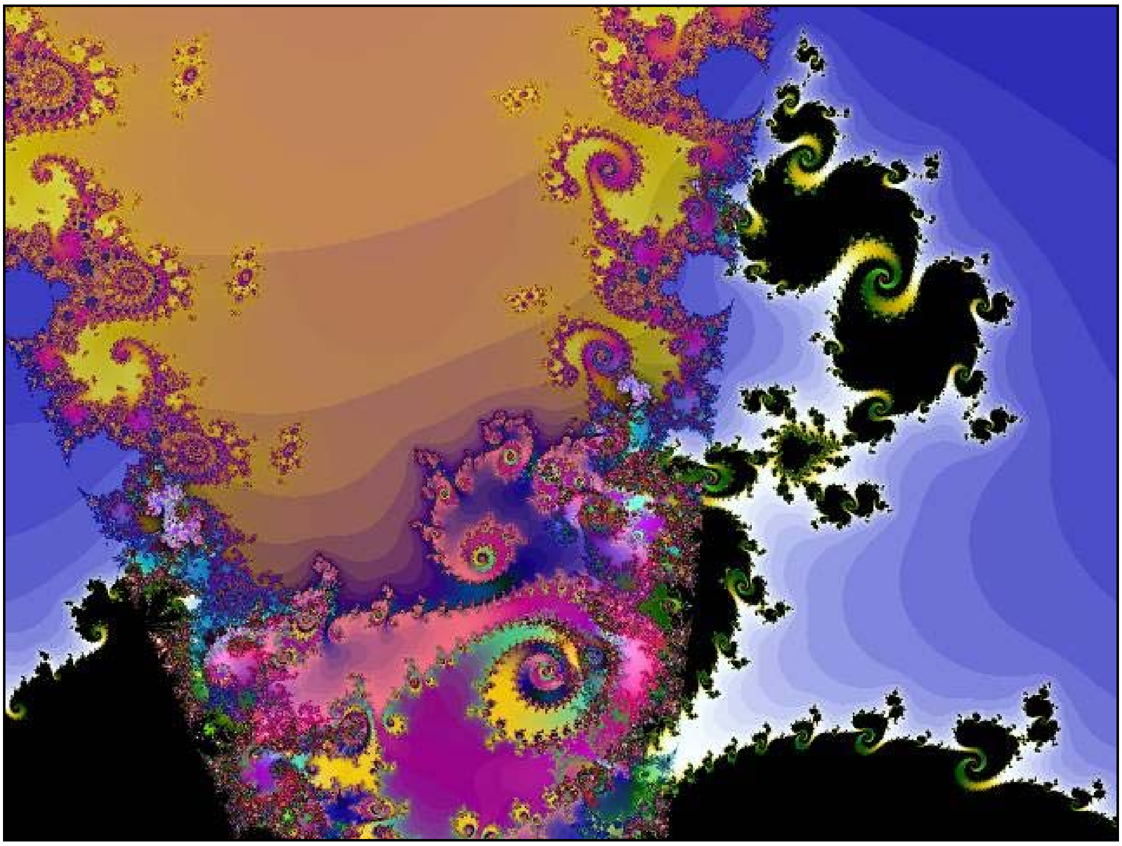

Fig 3. a=0.633+0i zoom 3.

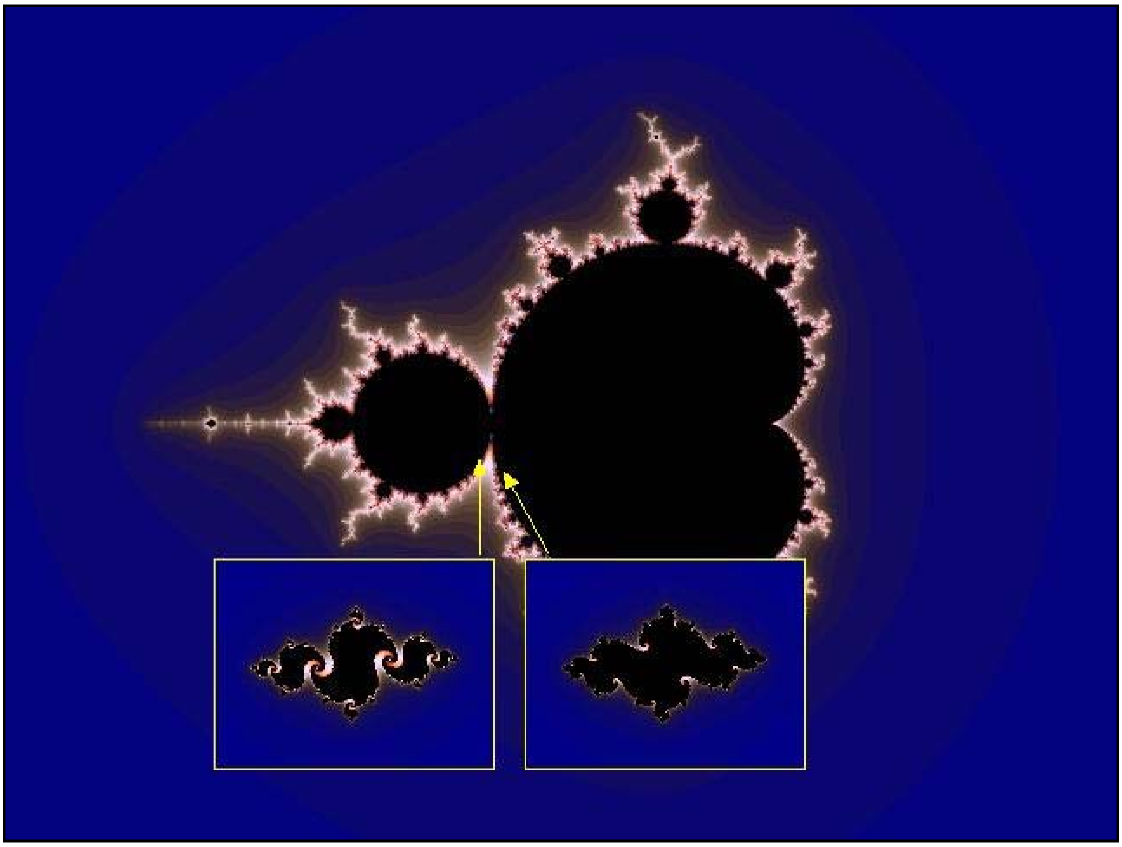

Fig 4. Mandel - Julia.

are inserted. The arrows show approximately the spots in the M set from which the parameters are picked up. Compare these Julia sets with the two uppermost Julia shaped components in the figure 1 (a=0.633+0i-zoom1). However note that the M- ”Mandelbrot set” is rotated a half turn compared with the ordinary M set.

All the above features are common to especially the slices in the systems a_{real}, a_{imag} and b_{real}, b_{imag}. What to say about the features of the four other perpendiculars systems of slices? The answer is, the above-described features are almost the same. The difference is that the motives are more or less tilted. Further more the components sometimes are tied, in some cases tied to long threads making me thought on bubble gums. The two last images below (”a_{real} = 0.4,b_{real} = 0” and ”a_{real} = 0.4,b_{real} = 0-zoom”) are an example of that.

At last: If you rotate between the perpendiculars systems of slices, doesn't matter if intersecting origo or not, the features are the same as in the last mentioned cases.

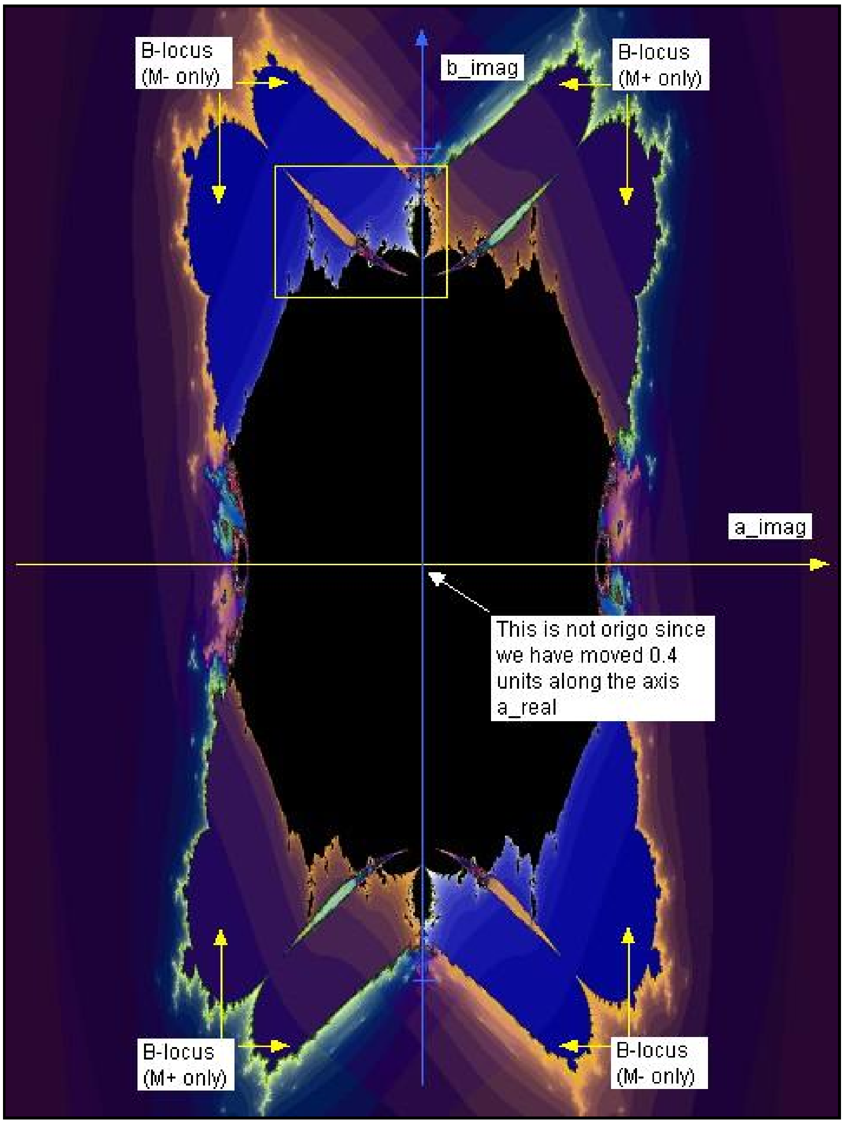

Fig 5. a_{real} = 0.4, b_{real} = 0.

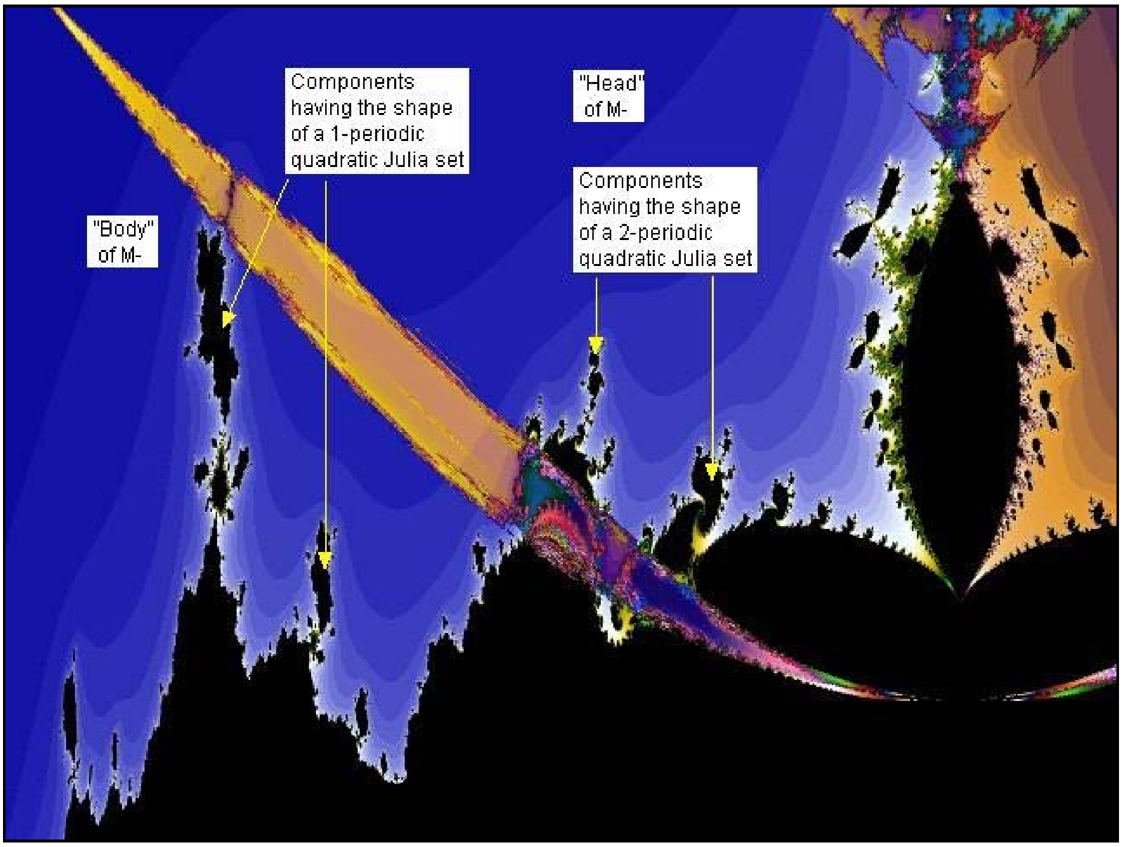

Fig 6. a_{real} = 0.4, b_{real} = 0 zoom.

Don't forget my ”Cubic Tutorial” and ”Pictures from Cubic Parameterspace” reachable from my index page.

Regards
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