A Celebration of Beauty by Kerry Mitchell

Recently, I’ve taken to a more subtle method, letting the fractal create the photograph.

As an algorithmic artist, I seek to celebrate the beauty of math. For me, math can be found in the formulas used to create a fractal image, in the particular choice of parameters, or in the unique ways that I combine multiple layers into a finished image.

Twenty-some years ago, I began my artistic career by working with fractals. By now, everyone familiar with digital art has seen the Mandelbrot set and I would guess that most are sick of it. However, everyone has seen a tree, but photographers keep taking artful pictures of them. Similarly, I think that fractals (and the Mandelbrot set in particular) still offer a lot to the artist, and it’s up to us artists to find and reveal their beauty. I often return to the Mandelbrot set for inspiration and to try out new ideas. Heavy Weather is the result of one such return. In this image, the Seahorse Valley spirals are immediately recognizable, but the streaks and texture bring a new twist to a familiar subject. I try to always find novel ways in which to render fractals. Here, I employed a technique of randomly taking the points to be calculated from a line, instead of from the image window. This gave the streaks. The sampled points were then used to calculate the (rather ugly) fractal. I repeated this process on several additional layers and averaged them together, bringing forth the cloud-like texture.
 Heavy WeatherI began combining fractals with photographs about 10 years ago when I merged the famous Apollo 17 image of the full Earth from space with a Julia set fractal. Recently, I’ve taken to a more subtle method, letting the fractal create the photograph, as I did in Oak Tree. The fractal is a combination of several space-filling curves (curves that, when taken to their mathematical limits, would occupy every point in an area even though the curve itself has no thickness). I varied the thickness of the curve in accordance with the grayscale level of the target photograph, Ansel Adams’ Oak Tree, Sunset City, California. I contrasted the straight, precise lines of the curve with the natural branching of the tree and tried to pay homage to Adams’ image of a fractal with one of my own. Oak TreeWhen I discovered fractals, I was working as an aerospace engineer. Many of the techniques in computational aerodynamics are conceptually similar to fractal generation methods. In Spider, I used a fractal program to create an image of four interacting vortices, such as those you might see coming off of a spoon when stirring a cup of coffee. Instead of capturing any realistic flow features, I minimally colored the field to suggest the spider. In Nine, I used a more expansive coloring technique to capture the mutual influences of the nine vortices on each other. Spider
 NineGreen Belt is based on a study of the instability of a routine for calculating complicated formulas. One such formula is called the Fresnel integral and is used in optics. Graphically, the exact formula produces a double-headed spiral, the basic shape in the green curves in the image. However, the exact formula doesn’t yield easily to pencil-and-paper analysis, so it is often approximated numerically using a computer. What can happen is reflected in the image. Instead of a curve that begins at one point, winds out, moves to another point and winds in, the errors produced in the program accumulate and the resulting curve meanders around the image, stopping to wind in and back out before moving on. Changing the parameters slightly gives a markedly different type of curve, one that wiggles while traveling along a square grid. I decided to juxtapose the more organic version as a green belt of grass and trees winding around the urban development, symbolized by the gray, more rectangular, curve in the background. Green BeltOften, my images aren’t fractals at all. Sudoku 4b is one of a series of four images based on the game of sudoku. Here, the puzzle is based on the number 4 instead of 9 and I used a set of four shapes (pointing up, down, left, or right) instead of the digits 1-9. The concept of 4 is continued with four layers making up the final image. Each layer uses a different base shape in a different color. The other three images in this series use the same concept (four layers, four variations of four base shapes, four colors), using rectangles, triangles, and Truchet tiles. Sudoku 4bSignature of Phi is an illustration of what’s termed the signature sequence of a number. For an irrational number like phi (about 1.618...), this sequence of whole numbers is a fractal. Closely associated with this sequence is another, similar, but different. I used one sequence as the x-coordinates and the other as the y-coordinates and drew the polyline connecting the points. If you look closely, you can see that the image is one continuous zigzag line from the lower left corner to the upper right. The similarities in the sequences mean that the line never crosses itself. The differences mean that the slopes of the segments vary slightly. When the segments come closer together, virtual images of dark rectangles are formed along the diagonal. Signature of PhiThis image highlights one characteristic of my work—I’m very much interested in the structures and shapes that the algorithms, functions, and numbers create. Consequently, I don’t worry so much about color, texture, and post-processing effects. They are important, but I much prefer to let the structures speak for themselves.

Kerry Mitchell