

Uses of Fractals and Chaos

In the natural sciences fractals are used to describe what can not be described by Euclidean geometry. The geography of the Moons of Endor in George Lucas's "The Return of the Jedi" were created by fractals. Two young Ph'D candidates in mathematics were hired to program the computer and create the graphics for the movie. They made so much money they decided not to continue in school.

Fractals are used to compress images in industry. The compression is by reducing data redundancies. The Sierpinski gasket compresses 10,000:1. It is better than the J-pack which it replaced.

Jhane Barnes uses fractals in the design of the fabric she uses for her mens wear. She is one of the foremost American designers of mens wear. Her clothes may be bought in Bloomingdales, Saks, Neiman Marcus and Nordstroms. She uses a computer with fractal programs to generate the design. She uses weaving, textile software to determine how the design is to be woven into fabric.

The study of chaos has helped with predictions of the weather, stock market, etc. The models it presents has helped in the study of population growth or decline in various species of birds, fish, or animals.

Many finance experts across the United States are applying fractal data analysis to investment markets.

Dr. Douglas Rees at the University of California at Los Angeles has shown that the protein surfaces of hemoglobin which transports oxygen in the blood has a fractal dimension of around 2.4.

Dr. Robert May, a mathematical biologist at Princeton University, has worked on simulations of the spread of AIDS based on the structured irregularities found in fractal geometry.

Dr. Richard Voss while at IBM's research laboratories in New York state produced fractal forgeries of music on a computer using white, brown, and $1/f$ noise.

In Sudbury, Ontario, Canada, scientists studied pollution that is in the shape of a fractal. Soot when spewing out into the atmosphere has a fractal shape. They believe to change the effects of pollution you first change the shape. They have found that temperature (heat) will smooth out the shape and then man's system can be cleansed easier of the effects of the pollution by itself.

Many times the research in mathematics is far ahead of the applications. What is being discovered purely for mathematical interest will find an application in the sciences or elsewhere in the future.