

## **I.F.S. Fractals Setup**

Use this dialog box to change the settings for the I.F.S. Fractals screen saver. This screen saver computes, and then displays, an I.F.S. Fractal, consisting of a number of dots. After a certain time interval, which you can specify, a new I.F.S. fractal will be computed. The dots will move, in a number of steps which you can specify, from their positions in the old to their positions in the new I.F.S. fractal.

Choose one of the following buttons for information about the dialog box:

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## Fractal Options

Here you can specify a number of options of the I.F.S. fractal:

- The number of points in the I.F.S. fractal.
- The color in which the fractal will be drawn. This color can be specified, or can be chosen randomly.
- Whether random mutations will be performed to the I.F.S. fractal matrix, always chosen randomly from a list of 50 standard matrices.

## **Animation Options**

Use these options to set the number of steps in the animation of the old fractal into the new one, and the number of seconds which a fractal will stay on the screen.

## Password Options

Use these to use a password with the screen saver.

- Select the Password Protected check box to turn on password protection. When password protection is turned on, you cannot return to Windows from the screen saver until you type the password.
- To assign a password to the screen saver, press the Set Password button, and then complete the Change Password dialog box.

## What are I.F.S. Fractals?

I.F.S. (Iterated Function Systems) fractals are figures in a  $n$ -dimensional space generated by transforming points, using a matrix multiplication followed by a vector multiplication, into a new point. The old and the new point are then plotted or connected with lines. In the I.F.S. fractals screen saver, the points are two-dimensional. I.F.S. fractals were first explored by Michael Barnsley and his co-workers at the Georgia Institute of Technology.

A two-dimensional I.F.S. fractal is defined by a  $(6 \times n)$  matrix. For example: The world-famous fern fractal is defined by the following  $(6 \times 4)$  matrix:

|       |       |       |      |      |      |
|-------|-------|-------|------|------|------|
| 0.00  | 0.00  | 0.00  | 0.16 | 0.00 | 0.00 |
| 0.20  | -0.26 | 0.23  | 0.22 | 0.00 | 1.60 |
| -0.15 | 0.28  | 0.26  | 0.24 | 0.00 | 0.44 |
| 0.85  | 0.04  | -0.04 | 0.85 | 0.00 | 1.60 |

The values on each line define a  $(2 \times 2)$  matrix, and a  $(1 \times 2)$  vector. If we define a  $(6 \times 1)$  I.F.S. matrix as:

a b c d e f,

then the  $(2 \times 2)$  matrix, and the  $(2 \times 1)$  vector are:

| matrix | vector |
|--------|--------|
| a b    | e      |
| c d    | f      |

A  $(1 \times 2)$  point in the I.F.S. fractal is transformed into a new one by taking its vector product with the  $(2 \times 2)$  matrix, and the  $(2 \times 1)$  vector.

Each of the  $n$  lines in the  $(6 \times n)$  matrix has a relative probability corresponding to the determinant of its  $(2 \times 2)$  matrix of being used to transform the old fractal point into a new one.

In the I.F.S. fractals screen saver, a  $(6 \times n)$  matrix, with  $n$  between 3 and 5, is chosen randomly from a list of 50 default values. Optionally, it is possible to replace a randomly chosen matrix element with a random number.

## **Bug Reports**

If you find any bugs in this program, or have any suggestions or questions about the program or any other matter (life in general, the universe, etc.) please contact me and I will give you a response as soon as possible.

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