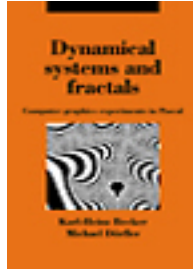


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Dynamical Systems and Fractals

Computer Graphics Experiments with Pascal

Karl-Heinz Becker, Michael Dörfler, Translated by I. Stewart

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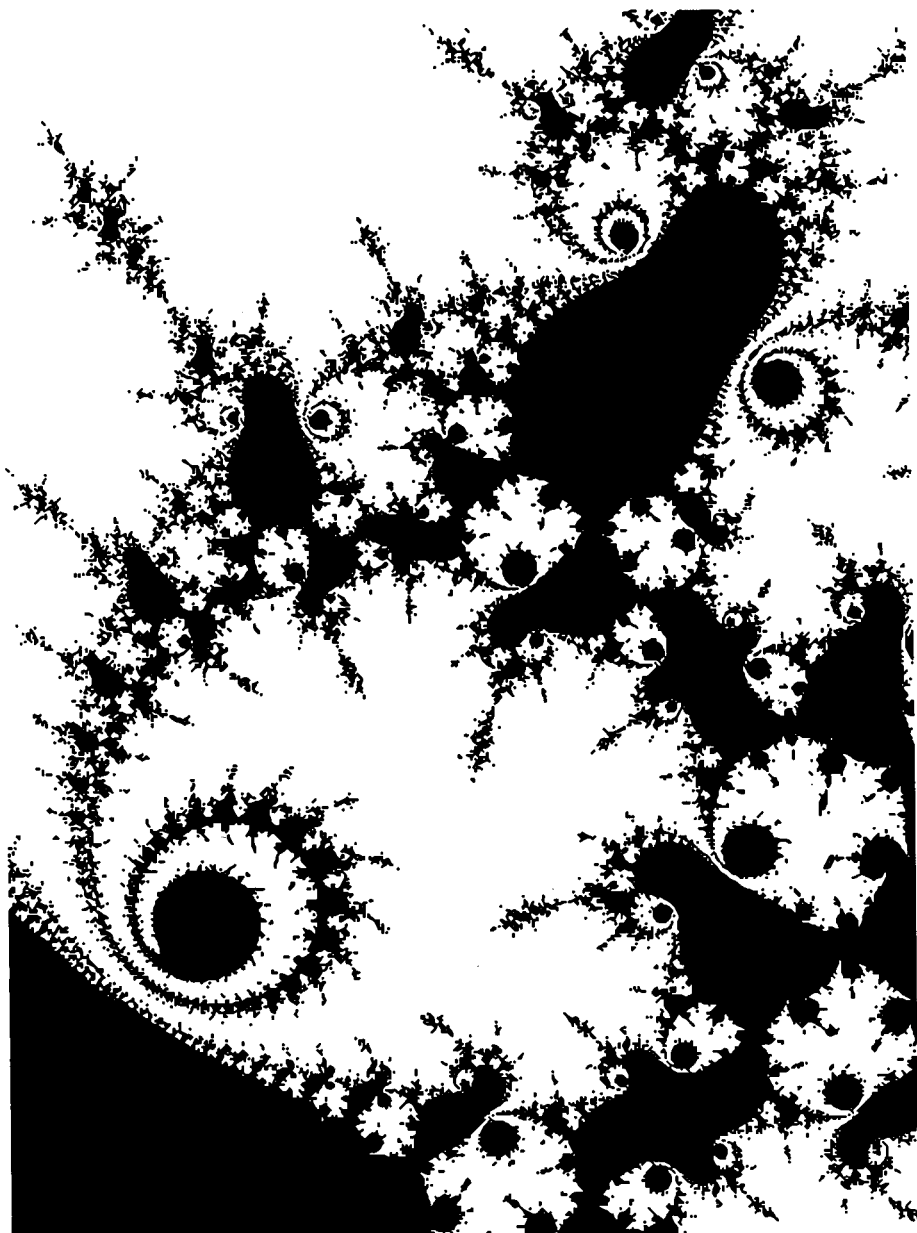
Chapter

10 - Journey to the Land of Infinite Structures pp. 247-256

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10 Journey to the Land of Infinite Structures



With our final experiments on fractal graphics, and questions of the fundamental principles of chaos theory that are today unresolved, we end the computer graphics experiments in this book. That does not mean that the experiment is over for you. On the contrary, perhaps it has only just really begun.

For the Grand Finale we invite you on a trip into the Land of Infinite Structures. That is what we have been discussing all along. A microcosm within mathematics, whose self-similar structures run to infinity, has opened up before us.

Have you ever seen the Grand Canyon or Monument Valley in America? Have you perhaps flown in an aeroplane through their ravines and valleys? Have you gazed out from a high peak upon the scenery below? We have done all that in the Land of Infinite Structures, too. And here we have once more collected together some of the photographs as a memento.

With the sun low in the evening, when the contours are at their sharpest, we fly from the west into Monument Valley. Rocky outcrop upon rocky outcrop towers red into the sky. Below spreads the flat land of the reservation. Between two mesas we lose height and turn to the right:

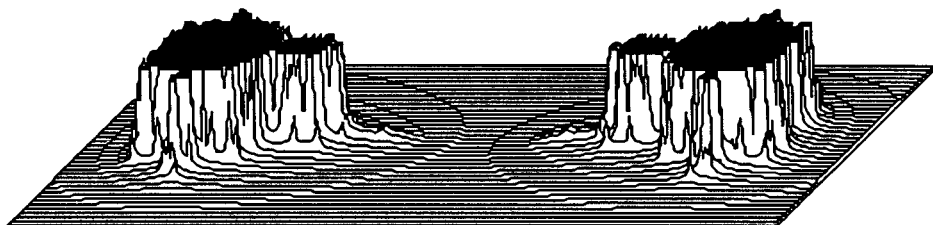


Figure 10.1

Ahead of us stretches the plateau. At its edge, as far as the eye can see in the twilight, stretch the cliffs, seeming to lose themselves in the infinite distance:

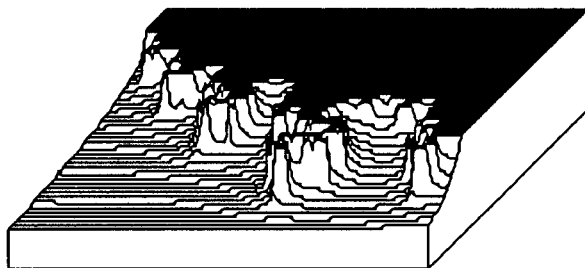


Figure 10.2

A glance at our flight-plan shows that we are flying in the area of a basin boundary:

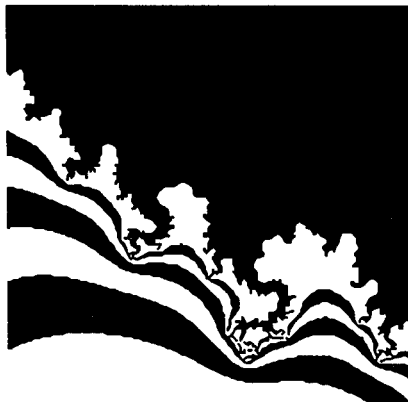


Figure 10.3

The nearer we approach, the more precipitous and forbidding the slopes become, throwing long shadows in the evening sun:

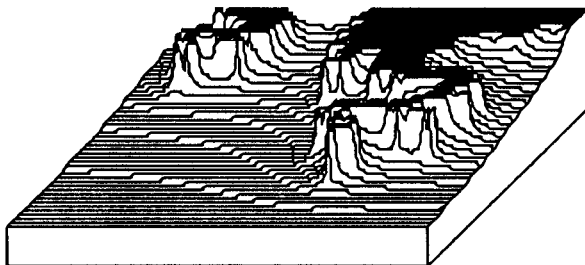


Figure 10.4

Suddenly a gap opens up in the hitherto impenetrable massif. We follow it with the setting sun. The gap becomes smaller and smaller. We switch on the terrain radar. Whenever critical points loom ahead, we switch to the next level of magnification:



Figure 10.5

Once more we must climb, to gain height, until behind the winding mountain chain the airport lights appear:

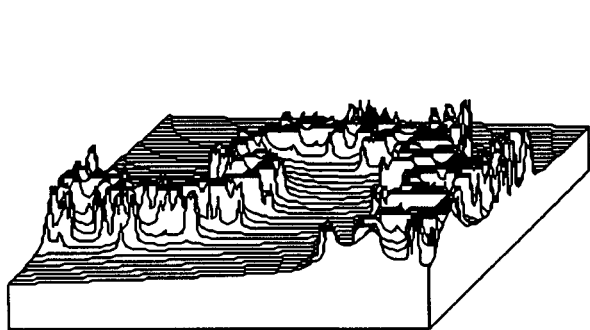


Figure 10.6

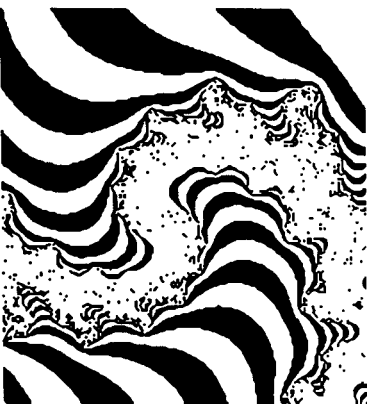


Figure 10.7

The following day, when we fly over the Grand Canyon, our appetite for the variety of the forms that the Colorado has engraved in the rock during its thousand-year efforts is insatiable. Joe, the pilot, has switched on the terrain radar, which plots contour lines. Remarkably, as in the three-dimensional world of forms, which lies before our eyes, a strange reality now appears.

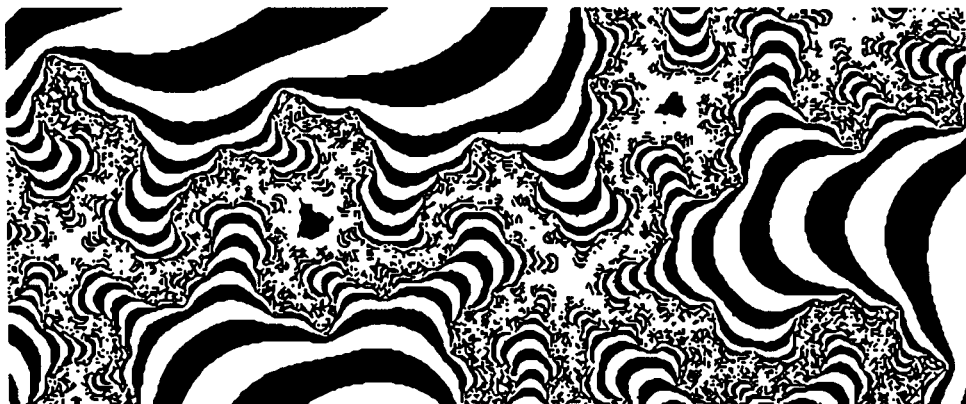


Figure 10.8

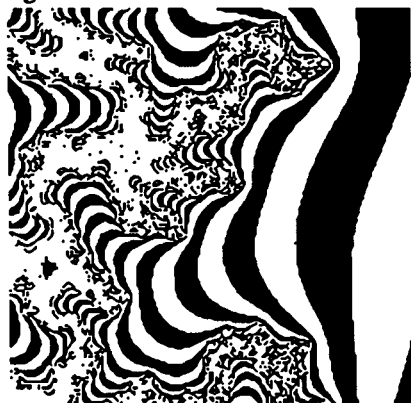


Figure 10.9



Figure 10.10



Figure 10.11

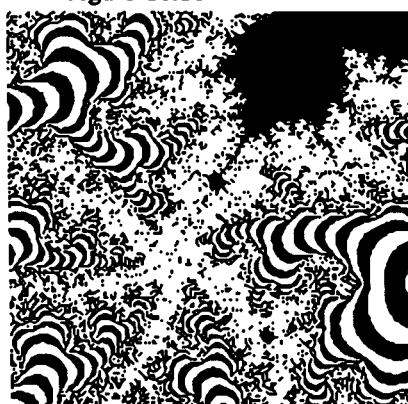


Figure 10.12



Figure 10.13



Figure 10.14

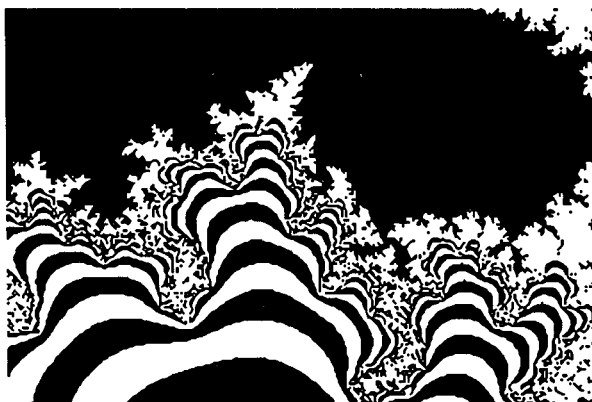


Figure 10.15

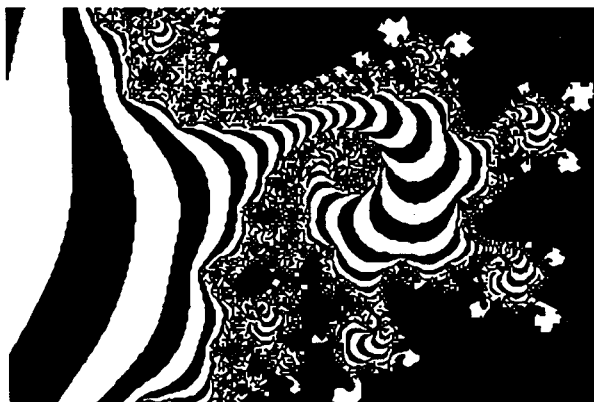


Figure 10.16

A few days later we depart from base in a car to see the local terrain. We encounter two Indians, who want to sell us their artwork, carvings, drawings, and finely beaten jewellery. We have never seen such art before. The forms are hardly ever geometrically simple. Indeed, in general we find complex patterns, which split up infinitely finely (see the following figures). We ask the Indians what this art-form is called but do not understand what they say. 'Ailuj, Ailuj!' they cry, and point to their drawings. What is this 'Ailuj'? We do not understand.

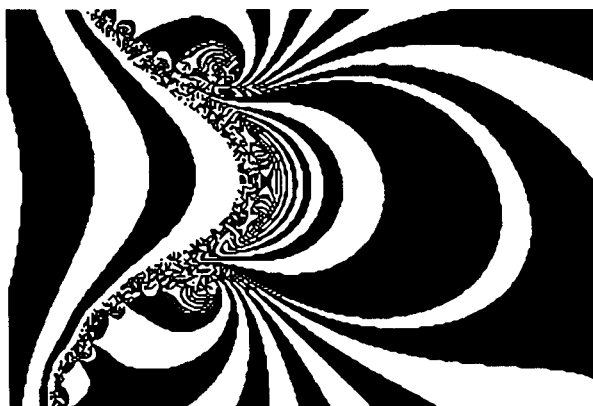


Figure 10.17

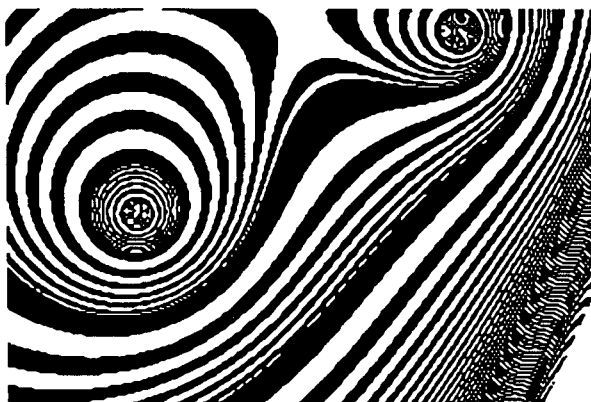


Figure 10.18

On the next day of the trip we once more fly over the outcroppings of the Grand Canyon. 'How many years did it take the Colorado to produce these contours? It is at most a hundred years since humans first saw them.'

We scramble out of the aircraft and look around at the place we have reached:

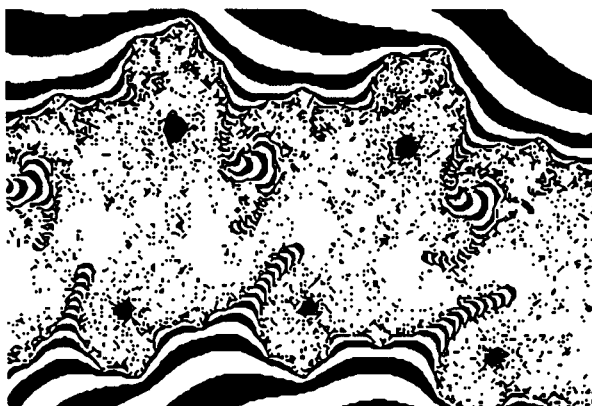


Figure 10.19

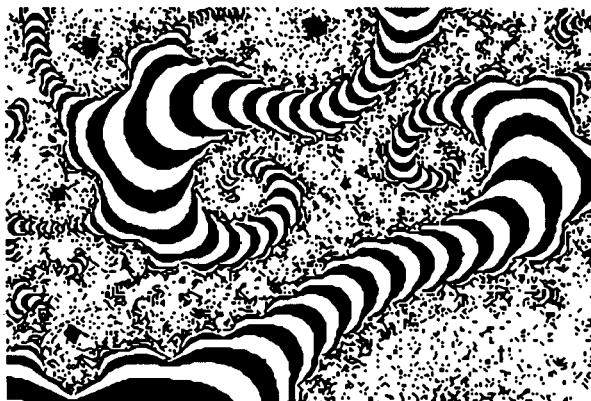


Figure 10.20



Figure 10.21

We look again. I point silently to the heavens. A flock of birds flies to the west. They go on forever.

