The Topology of Chaos Chapter 1: Overview

> Robert Gilmore

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The Topology of Chaos Chapter 1: Overview

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Background

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J. R. Tredicce

Can you explain my data?

I dare you to explain my data!

Motivation

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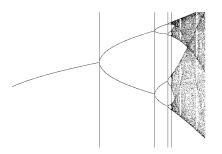
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Where is Tredicce coming from?



Feigenbaum:

$$\alpha = 4.66920 \ 16091 \dots$$

 $\delta = -2.50290 \ 78750 \dots$

Experiment

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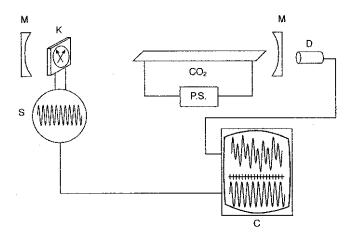
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LSA Experimental Arrangement



Our Hope

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Original Objectives

Construct a simple, algorithmic procedure for:

- Classifying strange attractors
- Extracting classification information

from experimental signals.

Our Result

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Result

There is now a classification theory.

- It is topological
- 2 It has a hierarchy of 4 levels
- 6 Each is discrete
- There is rigidity and degrees of freedom
- **1** It is applicable to R^3 only for now

Topology Enters the Picture

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The 4 Levels of Structure

- Basis Sets of Orbits
- Branched Manifolds
- Bounding Tori
- Extrinsic Embeddings

Topological Components

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Organization

LINKS OF PERIODIC ORBITS

organize

BOUNDING TORI

organize

BRANCHED MANIFOLDS

organize

LINKS OF PERIODIC ORBITS

