Alice in Stretch & SqueezeLand: 8 Basis Sets of Orbits

Chapter Summary-0

Basis Sets o Orbits-01

Basis Sets of Orbits-02

Basis Sets o Orbits-03

Basis Sets o Orbits-04

Basis Sets o Orbits-05

## Alice in Stretch & SqueezeLand: 8 Basis Sets of Orbits

August 12, 2012

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#### Chapter Abstract

Alice in Stretch & SqueezeLand: 8 Basis Sets of Orbits

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Basis Sets o Orbits-01

Basis Sets of Orbits-02

Basis Sets o Orbits-03

Basis Sets o<sup>.</sup> Orbits-04

Basis Sets o<sup>.</sup> Orbits-05 As parameters change (current flow, modulation intensity, temperature,  $\cdots$ ) the shape of the attractor changes and the spectrum of unstable periodic orbits (UPOs) "in" the attractor changes.

It is easiest to describe these changes by identifying a small set of UPOs whose presence "forces" all the other UPOs in the attractor.

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#### Orbits Can be "Pruned"

Alice in Stretch & SqueezeLand: 8 Basis Sets of Orbits

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#### Basis Sets of Orbits-01

Basis Sets of Orbits-02

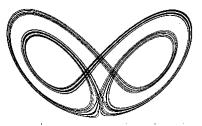
Basis Sets c Orbits-03

Basis Sets o Orbits-04

Basis Sets o Orbits-05

## There Are Some Missing Orbits

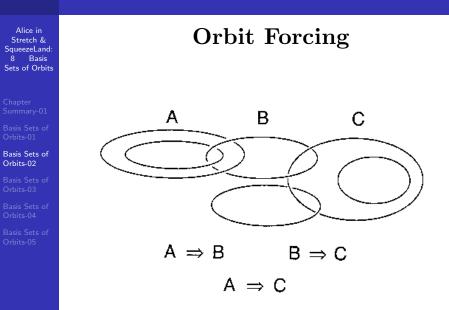




Lorenz

#### Shimizu-Morioka

### Linking Numbers, Relative Rotation Rates, Braids



#### An Ongoing Problem

Alice in Stretch & SqueezeLand: 8 Basis Sets of Orbits

Chapter Summary-02

Basis Sets o Orbits-01

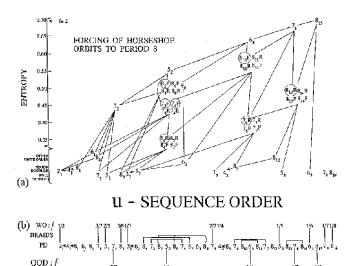
Basis Sets of Orbits-02

Basis Sets of Orbits-03

Basis Sets o Orbits-04

Basis Sets of Orbits-05

# Forcing Diagram - Horseshoe



900

### Algorithm

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Basis Sets o Orbits-05 List all orbits found up to period p by topological entropy, use 1D entropy as tie-breaker:

$$\underline{2_1}, \underline{4_1}, \underline{8_1}, \underline{6_1}, \underline{8_2}, \underline{7_1}, \underline{5_1}, \underline{8_3}, \underline{3_1}, \underline{6_2}, 6_3, 7_5, 4_2, 8_9, \underline{8_4}, \underline{8_5}, \underline{8_5},$$

 $8_7, 7_6, \underline{7_2}, \underline{7_3}, 7_4, \underline{8_5}, 8_6, 8_8, 5_2$ 

Remove rightmost orbit and all orbits it forces (underlined):

 $6_3, 7_5, 4_2, 8_9, 8_7R, 7_6, 7_4F, 8_6F, 8_8$ 

Continue until completed. List all "rightmost orbits" removed, right to left. This is the basis.

 $8_7R, 7_6, 7_4F, 8_6F, 8_8, 5_2$ 

### An Ongoing Problem

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## Status of Problem

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- Horseshoe organization active
- More folding barely begun
- Circle forcing even less known
- Higher genus new ideas required