An important component of the work for AFOSR was the discovery and investigation of riddled basins. A riddled basin for a chaotic attractor's basin is arbitrarily close to points in another attractor's basin (the first basin is "riddled" with holes). When an attractor has a riddled basin there is an extreme end-state sensitivity to initial conditions in the sense that for any initial condition in the riddled basin an arbitrarily small error in computation can result in the erroneous prediction of which attractor the initial condition is eventually attracted to. This contrasts with the more usual situation of a chaotic attractor with a non-riddled basin where any error in computation propagates exponentially but one can reliably say which attractor the initial condition is attracted to. Since the researchers discovery of the phenomenon of riddled basins, physical examples have been found in scattering, statistical mechanical, and ecological models. As can be seen from the bibliography, they have also done extensive work in other areas of dynamics, including the properties of indecomposable continua occurring in models of turbulent fluid flow.
PREFACE

This end of contract Progress Report for the Air Force Office of Scientific Research (Research Grant AFOSR F49620-92-J-0033) entitled "Theoretical Investigations of Chaotic Dynamics" of the period November 1, 1991 to October 31, 1993 is organized under the following two parts:

PART I

1. Publications in reviewed journals (we are including papers accepted and submitted for publication).

2. Book(s) or book chapter(s) published:
   None

3. Graduate Students supported:
   None

4. Postdoctoral Associates supported:
   None

5. External honors including major prizes, society awards, fellows of major societies, invited plenary addresses at major conferences, etc.

PART II

1. Invention Report

PART III

1. Appended Preprints
PART I

1. **Publications in reviewed journals** (since this was a new grant, we are also including papers accepted and submitted for publication):
   
   
   
   
   
   
   
   
   


l. "Bizarre Topology is Natural in Dynamical Systems", submitted to the *Bulletin of the American Math. Society*.


2. External honors including major prizes, society awards, fellows of major societies, invited plenary addresses at major conferences, 3tc.:


b. Celso Grebogi's invited lectures at conferences:

1) "Shadowing of Chaotic Trajectories", Conference on Chaos in Dissipative Systems, Trassenheide, Germany, April 8-11, 1992 (One hour Lecture).

3) "Control of Chaos", Conference on Nonlinear Dynamics in Optical Systems, Optical Society of America, Albach, Austria, June 22-26, 1992 (Forty-minute Lecture).


12) "Numerical Trajectories of Chaotic Systems", Summer School of Dynamical Systems and Nonlinear Analysis, University of Cape Town, South Africa, January 24-February 5, 1993 (One-hour Lecture).


17) "Shadowing in Chaotic Systems, Potsdam, Germany, August 30-September 3, 1993 (One-hour Lecture).

18) "Controlling Chaos", The Seventh Toyota Conference on Towards the Harnessing of Chaos, Lake Hamana Shizuoka, Japan, October 31-November 3, 1993 (One-hour Lecture).

c. James Yorke's invited lectures at conferences:

1) Oberwolfach, Germany, Conference on Applied Dynamics and Bifurcation, January 1992 (One-hour Lecture).

2) Naval Surface Warfare Center, Silver Spring, MD, Dynamics Day and a Half Minisymposium, 20 minute lecture, April 1992.

3) Carleton University, Ottawa, Canada, 14th Annual Analysis Day, April 1992 (One-hour Lecture).


5) Boston University, Regional Institute in Dynamical Systems, July 1992 (One-hour Lecture).


9) Lexington, KY, Midwest Southeastern-Atlantic Second Joint Conference on Differential Equations, University of Kentucky, Keynote address, November 1992 (One-hour Lecture).

10) Tempe, AZ, Dynamics Days Arizona, Arizona State University, Lecture and short course, January 1993.


12) Waterloo, Canada, Workshop on Pattern formation and Symmetry Breaking in PDEs, February 1993 (One-hour Lecture).

13) Knoxville, TN, AMS Southeastern Meeting, March 1993 (One-hour Lecture).

14) University of South Carolina, Columbia, Spring Topology Conference, March 1993 (One-hour Lecture).


19) Penn State University, "Semi-annual Regional Workshop in Dynamical Systems", October 1993 (One-hour Lecture).
20) Washington, DC., Howard University, Dynamical Systems Week, October 1993 (One-hour Lecture).

PART II

1. Invention Report

There are no inventions.
PART III

1. Appended Preprints