

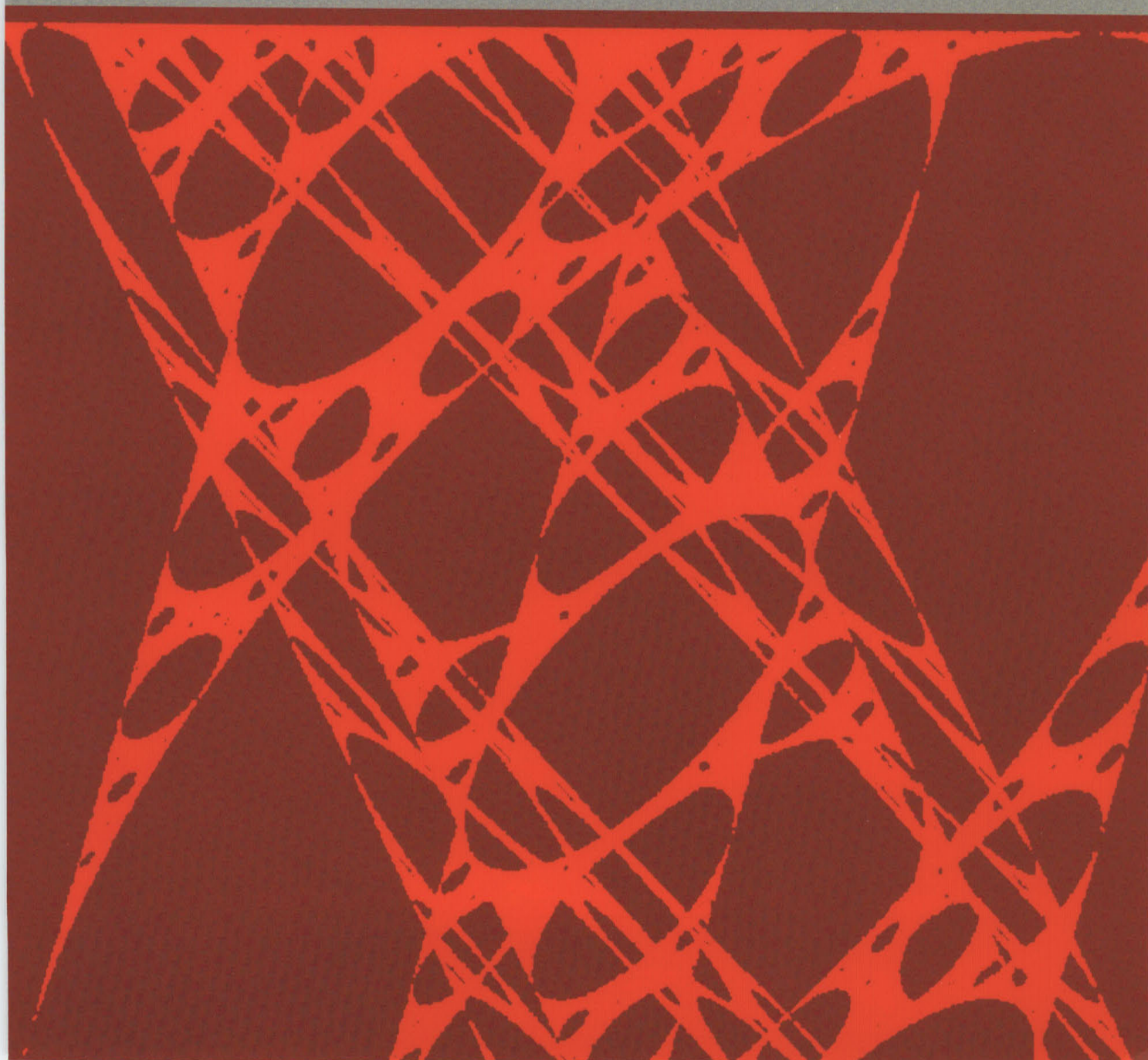
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

*The* RESEARCH LABORATORY *of* ELECTRONICS

# PROGRESS REPORT

NO. 131

JANUARY 1–DECEMBER 31, 1988





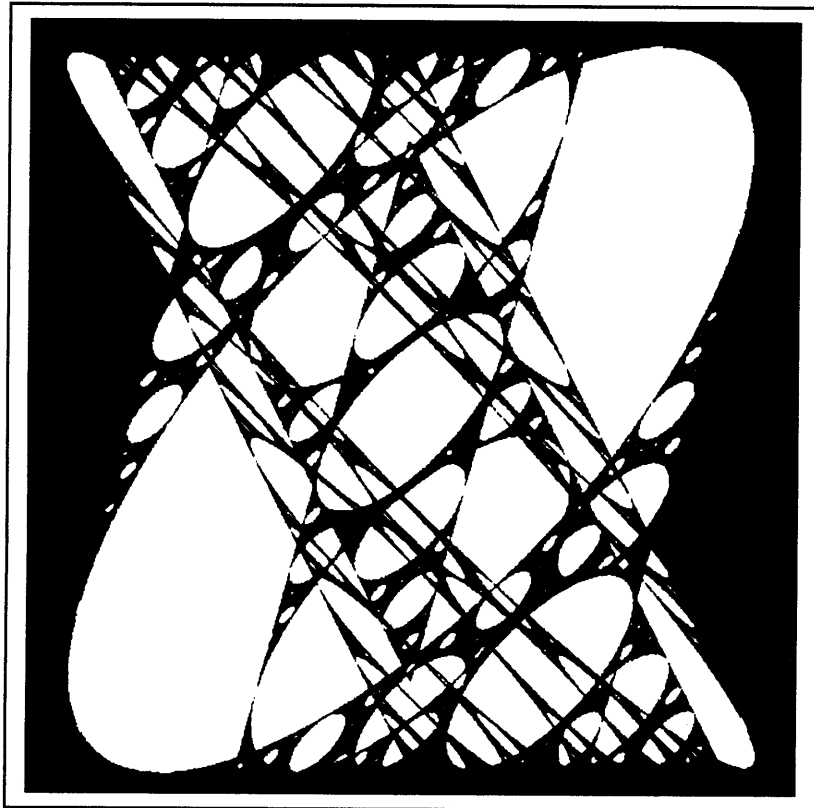
# ***RLE Progress Report***

**No. 131**

**January 1 - December 31, 1988**

Submitted by

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Professor Daniel Kleppner



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## RLE Progress Report No. 131

**Cover and title page:** Shown are the fractal patterns of state evolution in a non-linear dynamical system in chaos. In this case, the system corresponds to a finite-precision implementation of a linear digital filter. Gregory W. Wornell is studying this behavior and its applications to signal processing as part of his doctoral research with Professor Alan V. Oppenheim in RLE's Digital Signal Processing Group.

**Our special thanks** to the following staff members of the RLE Communications Group: Mary J. Ziegler for her exceptional editing, formatting, and scanning; Elisabeth O. Colford for preparation of the publications and personnel chapters and her intrepid assistance with editing and proofreading; and Rita C. McKinnon for her help with proofreading. We also want to thank David W. Foss, Manager of the RLE Computer Facility, for his technical assistance and Stuart D. Brorson of the Optics Group for his help with the chapter arrangement of this report.

We thank the faculty, staff, and students of RLE for their generous cooperation.

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# Introduction

## ***The Research Laboratory of Electronics***

The Research Laboratory of Electronics (RLE) was established in 1946 as the Institute's first interdepartmental laboratory. Originally organized under the joint sponsorship of the Departments of Physics and Electrical Engineering, RLE has broadened its interests to cover a wide range of research.

The RLE environment provides both the freedom of action essential in an academic institution and the availability of large-scale laboratory facilities and services required by researchers. RLE's interdisciplinary setting offers many opportunities for creative and collaborative research. By fostering this powerful combination of research and education, RLE effectively penetrates beyond the horizon of new ideas and information.

## ***RLE Progress Report***

*RLE Progress Report Number 131* describes research programs at RLE for the period January 1 through December 31, 1988. Each chapter of the *Progress Report* contains both a statement of research objectives and a summary of research efforts for research projects listed. Faculty, research staff, students and others who participated in these projects are identified at the beginning of each project, along with sources of funding.

There are three appendices at the end of the report: Appendix A is a bibliography of RLE publications and papers presented by RLE staff during 1988; Appendix B is a roster of current RLE staff; and Appendix C is an index of RLE sponsors. In addition, the Project Staff and Subject Index provides access to the information in this report.

*RLE Progress Report Number 131* was produced by the RLE Communications Office. Further inquiries may be addressed to:

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