PREFACE

This is the Proceedings of the First Symposium on Non-Linear Analysis, which was held at the Conference Hall of MIZUTA Memorial Library, Josai University, on April 25–27 1996.

The Spring 1996 Program in Non-linear Analysis(NLA) at Josai University brought together mathematicians interested in Convex Analysis, Stability Analysis in Dynamical Systems, Potential Theory with fractal boundary, Analysis in fractals and Chaotic Complex Dynamical Systems. It included a stimulating symposium, which antedated by two months WCNA-96 (The Second World Congress of Nonlinear Analysts) at Athens. Several participants of this symposium were invited speaker of the congress. The activities produced interesting results and fruitful intersections among the participants.

The theory of Convex Analysis and Dynamical system theory are the principale theme of this volume, together with related studies of chaos and fractals.

The simple non-linear system of three differential equations as a model of boundary layer convection exhibits remarkably complex behavior, known as Lorentz attractor with a *fractal dimension.* This type of behavior has been found to be ubiquitous, arising in many fields, including chemistry, biology and phisics, among others. Particular phenomena from these fields can be and have been used to provide prototype examples of non-linear dynamical systems.

The terms *chaos* and *fractals* have received widespread attention in recent years. The alluring computer graphic images associated with these terms have heightened interest among scientists in these ideas. The development of digital computers have provided reseachers with an additional tool to study aspects of dynamical systems previously considered too complex. Indeed, many of the fractal configulations shown in parts of this volume were generated by computer calculations of undelying two dimensional maps.

Chaos is the term used to describe the complicated behavior of systems of non-linear functions. *Fractals* is a term introduced by B.Mandelbrot to

describe and classify many complex shapes and patterns whose fractal (or Hausdorff) dimension is not an integer. The term is also useful in describing certain aspects of non-linear dynamical systems exhibiting chaotic behavior.

The lectures and articles, some of which are included here, cover a wide range of topics from convex analysis, dynamical systems and fractal geometry. The editor takes pleasure in thanking all the participants and authors for their work in producing this volume.

The symposium and the publication of this Proceedings were supported by Funding from the Special Grant of Josai University. We would like to express our thanks to the Authorities of Josai University who have supported the Program in NLA finacially, and to the Director of Josai University who permitted us to use the Conference Hall of MIZUTA Memorial Library in the university.

October 1996

K.Nishizawa
Department of Mathematics
Josai University
kiyoko@math.josai.ac.jp