PREFACE

This is the Proceedings of the Third Symposium on Non-Linear Analysis (NLA98), which was held at the Conference Hall of MIZUTA Memorial Library, Josai University, on July 23–25, 1998.

The Summer 1998 Program in Non-linear Analysis at Josai University brought together mathematicians interested in Convex Analysis, Potential Theory with fractal boundary, Analysis in fractals and Chaotic Complex Dynamical Systems. It included a stimulating symposium, which antedated by a week **NACA98** (International Conference on Nonlinear Analysis and Convex Analysis) in NIIGATA, JAPAN. Several participants of NLA98 were also invited speakers or members of the organizing committee of NACA98. The activities produced interesting results and fruitful intersections among the participants.

During the last four decades, developement of the theory of Nonlinear Analysis had great infuluence on mathematical science and its related area. At the same time, the theory of Convex Analysis and of Nonlinear Dynamical System have grown in connection with the study of problems of optimization, equilibriun, control, stability and chaos of linear or nonlinear systems.

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. *Chaos* is the term used to describe the complicated behavior of systems of non-linear functions. And *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.

These three mathematical disciplines, i.e., nonlinear analysis, convex analysis and chaotic dynamical systems, are the principale themes of this volume, together with related studies of fractals.

The editor takes pleasure in thanking all the participants and authors for their work in producing this volume.

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