

# Lecture Notes in Economics and Mathematical Systems

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Systems Theory

162

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## Recent Developments in Variable Structure Systems, Economics and Biology

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Edited by R. R. Mohler and A. Ruberti

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## Preface

The seminar for which the proceedings are published here evolved from a cooperative research program on bilinear systems and applications to immunology at the Oregon State University and at the University of Rome. The topics include more general forms of variable structure systems which may be divided into categories of mathematical system theory, economic applications and biological applications. Throughout the seminar there was emphasis on the integration of theory and application. In most cases, theoretical derivations are motivated by their need to solve practical problems.

In reading the proceedings, it becomes apparent that bilinear systems, quadratic systems and more general variable structure or adaptive systems become natural models in many cases and excellent approximations in others. It is seen that linear systems have very limited use particularly in economics and biology. Variable structure systems are analyzed in terms of structure, volterra kernels, system modelling, parameter identification, controllability and Lie algebra - to mention a few.

Certainly, it is not possible to present a complete treatment of these numerous topics, but at the same time the unifying power of the systems approach and variable structure systems is shown.

We wish to thank the National Science Foundation and the Consiglio Nazionale delle Ricerche for their support of this seminar within the frame work of the Cultural Agreement between the United States and Italy. Also we are grateful for the collaboration of numerous colleagues and friends who have helped make what we believe to be a worthy contribution.

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