MATHEMATICAL MODELS OF
PHYSICAL AND SOCIAL SYSTEMS

By: Demetrios G. Magiros*

ABSTRACT

In this paper a "classical procedure" is discussed for building mathematical models of physical, technological and real-life phenomena. The method is accompanied by appropriate remarks and applications.

In Chapter 1 the procedure is discussed for the model building, which is characterized by some steps of the investigation.

In Chapter 2 remarks are given related to concepts involved, to applicability of the method, to reasonability of the problem, etc. By these remarks the investigator faces views for examination and problems for solution.

In Chapter 3 applications are illustrated, by which one can see how the method for model building can be applied. The applications are distinguished into applications of "complete cycle" and of "incomplete cycle".

The paper is dedicated to Leon Brillouin, the outstanding scientist and human, whose memory will always be a source for inspiration in my work, and for whom my admiration, respect and gratitude are unlimited.

*Scientific Consultant
General Electric Co., RSD, Philadelphia, PA.
September, 1980

TABLE OF CONTENTS

INTRODUCTION

CHAPTER ONE

A CLASSICAL PROCEDURE FOR THE

CREATION OF MATHEMATICAL MODELS OF SYSTEMS

STEP I: Making the system well expressed physically.

STEP II: Making the system correctly stated mathematically.

2.1: Major and minor variables of the system.

2.2: Theory and model of the system.

STEP III: Getting a reasonable model.

STEP IV: Determining the actual solution.

STEP V: Comparing the results coming from the model with the empirical results.

SUMMARY

CHAPTER TWO

REMARKS ON THE CREATION OF MATHEMATICAL MODELS.

1. Remarks on the nature of a system and its isolation,

2. On the steps of modeling,

3. On controlled systems,

4. On the hypotheses,

5. On the variables of a system,

6. On the data; deterministic and stochastic systems,

7. On the theories of a system,

8. On the models of the systems,