

CONTENTS

<i>Preface</i>		ix
CHAPTER 1	Introduction	
1.1	Introduction	1
1.2	Methods of Solution	3
1.3	Numerical Integration of Initial Value Problems	7
1.4	Concluding Remarks	11
	References	11
CHAPTER 2	Method of Superposition	
2.1	Introduction	13
2.2	Reduction of Linear Boundary Value Problems to Initial Value Problems	13
2.3	Reduction of Third-Order Boundary Value Problems to Initial Value Problems	21
2.4	Concluding Remarks	25
	Problems	27
	References	28
CHAPTER 3	Method of Chasing	
3.1	Introduction	30
3.2	Derivation of Equations of Chasing By Jones— Second-Order Differential Equations	31
3.3	Application of the Method	32
3.4	Third-Order Differential Equations	42

3.5	Concluding Remarks	48
	Problems	49
	References	51
CHAPTER 4	The Adjoint Operator Method	
4.1	Introduction	52
4.2	Second-Order Differential Equations	54
4.3	Third-Order Differential Equations	62
4.4	Concluding Remarks	65
	Problems	66
	References	69
CHAPTER 5	Iterative Methods—The Shooting Methods	
5.1	Introduction	70
5.2	Newton's Method	71
5.3	Parallel Shooting	76
5.4	Quasi Linearization	84
5.5	Concluding Remarks	90
	Problems	91
	References	92
CHAPTER 6	Iterative Methods— The Finite-Difference Method	
6.1	Introduction	93
6.2	Finite Differences	93
6.3	Solution of Boundary Value Problems by Finite Difference	96
6.4	Second-Order Differential Equations	98
6.5	Third-Order Differential Equations	107
6.6	First-Order System and Newton's Method	126
6.7	Concluding Remarks	132
	Problems	134
	References	135
CHAPTER 7	Method of Transformation— Direct Transformation	
7.1	Introduction	137
7.2	Transformation for a Given Group of Transformations	143

7.3	Extension of the Transformation Method for a Given Group of Transformations	155
7.4	Uniqueness of the Solution Problems References	165 173 174
CHAPTER 8	Method of Transformation— Reduced Physical Parameters	
8.1	Introduction	177
8.2	Reduced Physical Parameters	177
8.3	Application to Simultaneous Differential Equations	192
8.4	Application to an Eigenvalue Problem	197
8.5	Concluding Remarks Problems References	202 204 206
CHAPTER 9	Method of Transformation— Invariance of Physical Parameters	
9.1	Introduction	208
9.2	Boundary Value Problem with Two or More Parameters	209
9.3	Systematic Search of Multiple Solutions	221
9.4	Thin Struts with Large Elastic Displacement Problems References	221 231 232
CHAPTER 10	Method of Parameter Differentiation	
10.1	Introduction	233
10.2	Nonlinear Algebraic Equations	234
10.3	Parameter Differentiation Applied to Differential Equations	246
10.4	Application to Simultaneous Equations	252
10.5	The General Parameter Mapping (GPM) of Kubicek and Hlavecek	260
10.6	Method of Continuation of Roberts and Shipman	264
10.7	Concluding Remarks Problems References	267 267 270

CHAPTER 11	Method of Invariant Imbedding	
11.1	Introduction	272
11.2	Concept of Invariant Imbedding	273
11.3	Isothermal Packed-Bed Chemical Reactor	275
11.4	Radiation Fins	279
11.5	Solution of Falkner–Skan Equation	280
11.6	Concluding Remarks	286
	Problems	286
	References	288
CHAPTER 12	Integral Equation Method	
12.1	Introduction	289
12.2	Linear Boundary Value Problems	290
12.3	Nonlinear Boundary Value Problems	298
12.4	Concluding Remarks	303
	Problems	304
	References	305
<i>Index</i>		307