

Contents

Preface	vii
Acknowledgments	xi
Introduction	xiii
I Models	1
Introduction	3
1 A Basic Overview of Immunology	5
2 Model of Infectious Disease	15
3 A Non-linear Synthesis of the Immune System	35
4 A Model of Anti-viral Immune Response	49
5 Compartmental Models	67
Appendix A: Modeling Delay Using Ordinary Differential Equations	83
References and Further Reading for Part I	89
II Clinical Data Processing	95
Introduction	97
6 The Problem of Parameter Estimation	101

7 Statistical Parameter Estimation	119
8 Marchuk–Zuev Identification Problem	141
9 An Experimental Influenza Investigation	155
10 Parameter Estimation for a Given Organism	165
Appendix B: Generalized Index Construction	185
References for Part II	191
 III Mathematical Models in Cancer Research	 195
Introduction	197
11 The Tumor Growth Models	203
12 Tumor Growth Index	217
13 Tumor Dynamics and Control	229
14 Data Analysis in Cancer Research	247
15 Further Development of Cancer Research	271
Appendix C: Other Models in Cancer Research	293
References for Part III	311