## **Contents**

Introduction	1 9
Chapter 1: Axiomatic Framework	
Dynamical Systems, Controllability, and Observability: A Post-Modern Point of View J.C. Willems	17
Chapter 2: Kalman Filtering	
Kalman Filtering: Whence, What and Whither? B.D.O. Anderson, J.B. Morre	41
From Kalman Filtering to Innovations, Martingales, Scattering and Other Nice Things T. Kailath	55
Kalman Filtering and the Advancementof Navigation and GuidanceP. Faurre	8 <b>9</b>
Quantum Kalman Filters L. Accardi	135
Chapter 3: The LQG Problem	
LQG as a Design Theory H. Kimura	147
State-Space $H_{\infty}$ Control Theory and the LQG Problem <i>P.P. Khargonekar</i>	159
Unified Continuous and Discrete Time LQG Theory	177
G.C. Gooawin, M.E. Saigaao	1//



## **Chapter 4: The Realization Problem**

Linear Deterministic Realization Theory A.C. Antoulas, T. Matsūo, Y. Yamamoto	191
Stochastic Realization Theory G. Picci	213
Chapter 5: Linear System Theory: Module Theory	
Algebraic Methods in System Theory         P.A. Fuhrmann	233
Module Theory and Linear System Theory M.L.J. Hautus, M. Heymann	267
Models and Modules: Kalman's Approach to Algebraic System Theory	270
Linear Realization Theory, Integer Invariants and Feedback Control	213
J. Hammer	295
<i>E.W. Kamen</i>	311
Chapter 5: Linear System Theory: Families of Systems	
Invariant Theory and Families of Dynamical Systems A. Tannenbaum	327
Chapter 5: Linear System Theory: Related Developments	
On the Parametrization of Input-Output Maps for Stable Linear Systems J.B. Pearson	345
Algebraic System Theory, Computer Algebra and Controller Synthesis J.S. Baras	355
On the Stability of Linear Discrete System and Related Problems <i>M. Mansour and E.I. Jury</i>	371
Chapter 6: Identification and Adaptive Control	<i></i>
Finite Dimensional Linear Stochastic System Identification P.E. Caines	389

Identification of Dynamic Systems from Noisy Data: The Case $m^* = 1$	
M. Deistler, B.D.O. Anderson	423
Adaptive Control K.J. Åström	437
Chapter 7: Generalizations to Nonlinear and Distributed Systems	
Kalman's Controllability Rank Condition: From Linear to Nonlinear E.D. Sontag	453
Controllability Revisited M. Fliess	463
On the Extensions of Kalman's Canonical Structure Theorem A. Ruberti, A. Isidori	475
Some Remarks on the Control of Distributed Systems J.L. Lions	491
Chapter 8: Influence in Mathematics	
The State Space Method in the Study of Interpolation by Rational Matrix Functions J.A. Ball, I. Gohberg, L. Rodman	503
The State Space Method for Solving Singular Integral Equations	
I. Gohberg, M.A. Kaashoek	509
Chapter 9: Applications	
Algebraic Structure of Convolutional Codes and Algebraic System Theory	527
System-Theoretic Trends in Econometrics	550
	559
R.W. Brockett	579
Subject Index	593