

## T A B L E O F C O N T E N T S

	Page
CHAPTER 1 - INTRODUCTION	
CHAPTER 2 - MATHEMATICAL PRELIMINARIES	
2.1 Introduction . . . . .	5
2.2 Linear Vector Spaces . . . . .	6
2.3 Linear Operators . . . . .	15
2.4 Scalar Matrices . . . . .	20
2.5 Polynomial Matrices . . . . .	24
2.6 Concluding Remarks and References . . . . .	36
Problems - Chapter 2 . . . . .	38
CHAPTER 3 - THE STATE SPACE	
3.1 Introduction . . . . .	44
3.2 State Representations . . . . .	46
3.3 The Determination of $e^{At}$ . . . . .	58
3.4 Equivalent Systems . . . . .	62
3.5 Controllability and Observability . . . . .	65
3.6 Controllable and Observable Companion Forms . . . . .	77
3.7 Concluding Remarks and References . . . . .	92
Problems - Chapter 3 . . . . .	94
CHAPTER 4 - FREQUENCY DOMAIN REPRESENTATIONS	
4.1 Introduction . . . . .	99
4.2 The Transfer Matrix . . . . .	100
4.3 The Structure Theorem . . . . .	105
4.4 Realization Theory (Time Domain Reduction) . . . . .	114
4.5 Concluding Remarks and References . . . . .	127
Problems - Chapter 4 . . . . .	130
CHAPTER 5 - DIFFERENTIAL OPERATOR REPRESENTATIONS	
5.1 Introduction . . . . .	134
5.2 Transfer and Equivalence Relations . . . . .	135
5.3 Differential Operator Controllability and Observability . . . . .	153
5.4 Realization Theory (Frequency Domain Reduction) . . . . .	158
5.5 System Invertibility and Functional Reproducibility . . . . .	161
5.6 Concluding Remarks and References . . . . .	177
Problems - Chapter 5 . . . . .	182
CHAPTER 6 - LINEAR STATE VARIABLE FEEDBACK	
6.1 Introduction . . . . .	190
6.2 Quadratic Optimization . . . . .	191
6.3 Pole Assignment via the Controllable Companion Form . . . . .	196
6.4 Asymptotic State Estimation . . . . .	205

	Page
CHAPTER 6 - LINEAR STATE VARIABLE FEEDBACK	
6.5 Concluding Remarks and References . . . . .	221
Problems - Chapter 6. . . . .	223
CHAPTER 7 - FREQUENCY DOMAIN COMPENSATION	
7.1 Introduction. . . . .	226
7.2 Frequency Domain Implications of State Feedback . . . . .	227
7.3 Frequency Domain State Estimation and Feedback. . . . .	231
7.4 A General Compensation Technique. . . . .	250
7.5 Concluding Remarks and References . . . . .	260
Problems - Chapter 7. . . . .	263
CHAPTER 8 - DESIGN OBJECTIVES	
8.1 Introduction. . . . .	269
8.2 Arbitrary Pole Placement. . . . .	271
8.3 Decoupling. . . . .	287
8.4 Static Decoupling . . . . .	305
8.5 Exact Model Matching. . . . .	316
8.6 Concluding Remarks and References . . . . .	324
Problems - Chapter 8. . . . .	329
REFERENCES. . . . .	343
INDEX . . . . .	351