

Contents

0.	Background Material	
1.	Introduction	1
2.	Matrix Theory Concepts and Notations	3
1.	Singular Linear Control Theory	
1.	Introduction	13
2.	Unbounded Admissible Controls	13
3.	Controllability and Observability	20
4.	Stabilizability	22
5.	Time Optimal Control	27
6.	Cheap Control and Nonsymmetric Riccati Equations	31
2.	Impulsive Behavior of Linear Systems	
1.	Introduction	46
2.	Distributions	47
3.	Distributions as Solutions	52
4.	Singular Perturbations	56
5.	Feedback Control of Impulses	64
3.	Circuits and Circuit Models	
1.	Introduction	73
2.	Basic Laws	74

3.	Linear Circuits	76
4.	Nonlinear Circuits	85
4.	Numerical Solution of Autonomous Linear Systems	
1.	Introduction	90
2.	First Order Methods	91
3.	Higher Order Methods	98
4.	Starting Values and Variable Time Step Methods	101
5.	Numerical Examples	107
6.	Comment on $\underline{Ax} = \underline{b}$	111
5.	Linear Time Varying Systems	
1.	Introduction	114
2.	The Index of a Linear Time Varying System	115
3.	The Index One Case	119
4.	Index Greater Than One	124
5.	Numerical Solution of Linear Time Varying Systems	134
6.	Nonlinear Singular Systems	
1.	Introduction	147
2.	General Concepts	148
3.	Index One Systems	153
4.	Higher Order Systems	154
5.	Linear Subsystems	164
6.	Hysteresis and Impulses	178

7.	Infinite Dimensional Linear Systems	
1.	Introduction	190
2.	Systems with Infinite Matrices	191
3.	Resolvent Techniques	205
4.	A Geometric Approach	210
	REFERENCES	220
	INDEX	229
	LIST OF SYMBOLS	232