Contents

Pref	face	xi
Ack	cnowledgments	xv
Cha	apter 1. Preliminary Considerations	
1.1	Introduction	1
1.2	Sparse Matrices	1
	Packed Form of Storage	2
1.4	Scaling	10
1.5	Bibliography and Comments	11
Cha	apter 2. The Gaussian Elimination	·
2.1	Introduction	15
2.2	The Basic Method	15
	Pivoting and Round-off Errors	19
2.4	The Elimination Form of Inverse	20

viii	Contents
------	----------

2.5 2.6 2.7	Minimizing the Total Number of Nonzero Elements in EFI Storage and Use of the Elimination Form of Inverse Bibliography and Comments	22 30 31
Chap	oter 3. Additional Methods for Minimizing the Storage for EFI	
3.1	Introduction	33
3.2	Methods Based on A Priori Column Permutations	34
3.3	Desirable Forms for Gaussian Elimination	40
3.4	Matrices and Graphs	41
3.5	The Block Diagonal Form	45
3.6	The Block Triangular Form	50
3.7	The Band Triangular Form	60
3.8	The Band Form	66
3.9	Other Desirable Forms	75
	Inverses of BTF and BBTF	79
3.11	Bibliography and Comments	80
Chap	oter 4. Direct Triangular Decomposition	
4.1	Introduction	83
4.2	The Crout Method	84
4.3	Minimizing the Fill-in for the Crout Method	87
4.4	The Doolittle (Black) Method	90
4.5	The Cholesky (Square-Root, Banachiewicz) Method	91
4.6	Desirable Forms for Triangular Decomposition	93
4.7	Bibliography and Comments	94
Chaj	oter 5. The Gauss-Jordan Elimination	
5.1	Introduction	95
5.2	The Basic Method	96
5.3	The Relationship between the PFI and the EFI	97
5.4	Minimizing the Total Number of Nonzeros in the PFI	101
5.5	Desirable Forms for the GJE	105
5.6	Bibliography and Comments	105
Chap	oter 6. Orthogonalization Methods	
6.1	Introduction	107
6.2	The Gram-Schmidt Method	107

Contents	
 6.3 Minimizing the Nonzeros in the RGS Method 6.4 The Householder Triangularization Method 6.5 The Fill-in for the RGS versus the HT Method 6.6 The Jacobi Method 	109 114 117 118
6.7 Bibliography and Comments	121
Chapter 7. Eigenvalues and Eigenvectors	
7.1 Introduction	123
7.2 The Givens Method	124
7.3 The Householder Method	127
7.4 Reduction to the Hessenberg Form	129
7.5 Eigenvectors7.6 Bibliography and Comments	132 132
Chapter 8. Change of Basis and Miscellaneous Topics	
8.1 Introduction	133
8.2 The Result of Changes in a Column of A on A^{-1}	134
8.3 Kron's Method of Tearing	138
8.4 Bifactorization	139
8.5 Bibliography and Comments	140
References	141
Author Index	153
Subject Index	
Subject Masis	