

CONTENTS

1. Introduction	1
1.1 The Book and How to Use It, 1	
1.2 Review of Vector and Matrix Algebra, 4	
1.3 Why Most Matrices Are Good, 10	
1.4 Reading FORTRAN, 12	

PART 1 STATIC AND STEADY-STATE MODELS

2. Systems With a Unique Solution	21
2.1 Linear Equations and the L - U Decomposition, 21	
2.2 Gaussian Elimination with Row Interchanges, 34	
2.3 Some Examples of Nonsingular Systems, 44	
2.4 Solving Nonsingular Systems with LINPACK, 66	
2.5 Systems Solvable by Iteration, 72	
3. Systems With Many Solutions	79
3.1 Linear Equations, Rank, and Row Reduction, 79	
3.2 Some Examples of Underdetermined Systems, 95	
3.3 Row Reducing Matrices with LINPACK, 108	

4. Overdetermined Systems	118
4.1 Vector Geometry and Overdetermined Systems of Equations, 118	
4.2 Fitting Equations to Data by Least Squares, 138	
4.3 Least-Squares Approximate Solutions Using LINPACK, 145	
4.4 More Fitting Equations to Data, 153	
 PART 2 DYNAMIC MODELS	
5. Discrete Time System Evolution	165
5.1 Iterative Inhomogeneous Linear Models, 165	
5.2 Eigenvectors and Eigenvalues, 171	
5.3 Computation of Eigenvectors and Eigenvalues, 185	
5.4 Some Homogeneous Matrix Power Models, 194	
5.5 Markov Processes, 208	
 6. Continuous Time System Evolution	 218
6.1 Systems of Differential Equations and Their Solutions by Eigenvectors and Eigenvalues, 218	
6.2 Examples of Systems of Differential Equations, 224	
 INDEX	 239