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Nota di contenuto	FRAGILE NETWORKS: Identifying Vulnerabilities and Synergies in an Uncertain World; CONTENTS; List of Figures; List of Tables; PART I NETWORK FUNDAMENTALS, EFFICIENCY MEASUREMENT, AND VULNERABILITY ANALYSIS; 1 Introduction and Overview; 2 Fundamental Methodologies, Network Models, and Algorithms; 2.1 Review of Variational Inequality Theory and its Relationships to Optimization; 2.2 Decentralized Decision-Making and User-Optimization; 2.2.1 The Network Equilibrium (U-O) Model with Fixed Demands; 2.2.2 Network Equilibrium (U-O) Models with Elastic Demands 2.3 Centralized Decision-Making and System-Optimization 2.3.1 The System-Optimization (S-O) Models; 2.3.2 System-Optimality Conditions; 2.4 Algorithms; 2.4.1 Equilibration Algorithms; 2.4.2 The Projection Method; 2.4.3 The Modified Projection Method; 2.4.4 The Euler Method; 2.5 Sources and Notes; 3 Network Performance Measurement and Robustness Analysis; 3.1 Some Preliminaries and Network Centrality Measures; 3.2 A Unified Network Performance Measure Based on Decentralized Decision-Making; 3.2.1 A Desirable Property of the Network Performance Measure; 3.2.2 The Importance of Network Components

3.2.3 Numerical Examples 3.2.4 An Application of the New Network Measure to the Braess Network with Varying Demands; 3.3 A Network Robustness Measure Under Decentralized Decision-Making Behavior; 3.3.1 Some Theoretical Results for the Network Robustness Measure under BPR Functions and Fixed Demands; 3.3.2 A Braess-Inspired Network; 3.4 Relative Total Cost Indices for Assessing Network Robustness; 3.4.1 Theoretical Results for Networks with BPR Functions; 3.4.2 A Network Example; 3.5 Summary and Conclusions; 3.6 Sources and Notes; PART II APPLICATIONS AND EXTENSIONS
4 Application of the Measures to Transportation Networks 4.1 A Larger Fixed Demand Network; 4.2 The Sioux Falls Network; 4.2.1 Importance of Links in the Sioux Falls Network; 4.2.2 Robustness of the Sioux Falls Network; 4.2.3 The Relative Total Cost Indices for the Sioux Falls Network; 4.3 The Anaheim Network; 4.3.1 Robustness of the Anaheim Network; 4.3.2 The Relative Total Cost Indices for the Anaheim Network; 4.4 The Environmental Robustness and Link Importance of Transportation Networks; 4.4.1 Environmental Emissions 4.4.2 Environmental Impact Assessment Indices for Transportation Networks 4.4.3 Environmental Link Importance Identification and Ranking; 4.4.4 Numerical Examples; 4.5 Summary and Conclusions; 4.6 Sources and Notes; 5 Supply Chain Networks with Disruption Risks; 5.1 Introduction; 5.2 The Supply Chain Model with Disruption Risks and Random Demands; 5.2.1 The Behavior of the Manufacturers; 5.2.2 The Behavior of the Retailers; 5.2.3 The Market Equilibrium Conditions; 5.2.4 The Equilibrium Conditions of the Supply Chain; 5.3 A Weighted Supply Chain Performance Measure
5.3.1 A Supply Chain Network Performance Measure

Sommario/riassunto

A unified treatment of the vulnerabilities that exist in real-world network systems-with tools to identify synergies for mergers and acquisitions Fragile Networks: Identifying Vulnerabilities and Synergies in an Uncertain World presents a comprehensive study of network systems and the roles these systems play in our everyday lives. This book successfully conceptualizes, defines, and constructs mathematically rigorous, computer-based tools for the assessment of network performance and efficiency, along with robustness and vulnerability analysis. The result is a thorough explorat
