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Autore	Pozrikidis C (Constantine), <1958->
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Nota di contenuto	Cover; CONTENTS; PREFACE; ONE-DIMENSIONAL GRIDS; 1.1 POISSON EQUATION IN ONE DIMENSION; 1.2 DIRICHLET BOUNDARY CONDITION AT BOTH ENDS; 1.3 NEUMANN-DIRICHLET BOUNDARY CONDITIONS; 1.4 DIRICHLET-NEUMANN BOUNDARY CONDITIONS; 1.5 NEUMANN BOUNDARY CONDITIONS; 1.6 PERIODIC BOUNDARY CONDITIONS; 1.7 ONE-DIMENSIONAL GRAPHS; 1.7.1 Graph Laplacian; 1.7.2 Adjacency Matrix; 1.7.3 Connectivity Lists and Oriented Incidence Matrix; 1.8 PERIODIC ONE-DIMENSIONAL GRAPHS; 1.8.1 Periodic Adjacency Matrix; 1.8.2 Periodic Oriented Incidence Matrix; 1.8.3 Fourier Expansions; 1.8.4 Cosine Fourier Expansion 1.8.5 Sine Fourier Expansion GRAPHS AND NETWORKS; 2.1 ELEMENTS OF GRAPH THEORY; 2.1.1 Adjacency Matrix; 2.1.2 Node Degrees; 2.1.3 The Complete Graph; 2.1.4 Complement of a Graph; 2.1.5 Connectivity Lists and the Oriented Incidence Matrix; 2.1.6 Connected and Unconnected Graphs; 2.1.7 Pairwise Distance and Diameter; 2.1.8 Trees; 2.1.9 Random and Real-Life Networks; 2.2 LAPLACIAN MATRIX; 2.2.1 Properties of the Laplacian Matrix; 2.2.2 Complete Graph; 2.2.3 Estimates of Eigenvalues; 2.2.4 Spanning Trees; 2.2.5 Spectral Expansion; 2.2.6 Spectral Partitioning; 2.2.7 Complement of a Graph 2.2.8 Normalized Laplacian 2.2.9 Graph Breakup; 2.3 CUBIC NETWORK; 2.4 FABRICATED NETWORKS; 2.4.1 Finite-Element Network on a Disk;

2.4.2 Finite-Element Network on a Square; 2.4.3 Delaunay Triangulation of an Arbitrary Set of Nodes; 2.4.4 Delaunay Triangulation of a Perturbed Cartesian Grid; 2.4.5 Finite Element Network Descending from an Octahedron; 2.4.6 Finite Element Network Descending from an Icosahedron; 2.5 LINK REMOVAL AND ADDITION; 2.5.1 Single and Multiple Link; 2.5.2 Link Addition; 2.6 INFINITE LATTICES; 2.6.1 Bravais Lattices; 2.6.2 Archimedean Lattices; 2.6.3 Laves Lattices; 2.6.4 Other Two-Dimensional Lattices; 2.6.5 Cubic Lattices; 2.7 PERCOLATION THRESHOLDS; 2.7.1 Link (Bond) Percolation Threshold; 2.7.2 Node Percolation Threshold; 2.7.3 Computation of Percolation Thresholds; SPECTRA OF LATTICES; 3.1 SQUARE LATTICE; 3.1.1 Isolated Network; 3.1.2 Periodic Strip; 3.1.3 Doubly Periodic Network; 3.1.4 Doubly Periodic Sheared Network; 3.2 MOBIUS STRIPS; 3.2.1 Horizontal Strip; 3.2.2 Vertical Strip; 3.2.3 Klein Bottle; 3.3 HEXAGONAL LATTICE; 3.3.1 Isolated Network; 3.3.2 Doubly Periodic Network; 3.3.3 Alternative Node Indexing; 3.4 MODIFIED UNION JACK LATTICE; 3.4.1 Isolated Network; 3.4.2 Doubly Periodic Network; 3.5 HONEYCOMB LATTICE; 3.5.1 Isolated Network; 3.5.2 Brick Representation; 3.5.3 Doubly Periodic Network; 3.5.4 Alternative Node Indexing; 3.6 KAGOME LATTICE; 3.6.1 Isolated Network; 3.6.2 Doubly Periodic Network; 3.7 SIMPLE CUBIC LATTICE; 3.8 BODY-CENTERED CUBIC (BCC) LATTICE; 3.9 FACE-CENTERED CUBIC (FCC) LATTICE; NETWORK TRANSPORT; 4.1 TRANSPORT LAWS AND CONVENTIONS; 4.1.1 Isolated and Embedded Networks; 4.1.2 Nodal Sources; 4.1.3 Linear Transport; 4.1.4 Nonlinear Transport; 4.2 UNIFORM CONDUCTANCES; 4.2.1 Isolated Networks; 4.2.2 Embedded Networks

Sommario/riassunto

An Introduction to Grids, Graphs, and Networks aims to provide a concise introduction to graphs and networks at a level that is accessible to scientists, engineers, and students. In a practical approach, the book presents only the necessary theoretical concepts from mathematics and considers a variety of physical and conceptual configurations as prototypes or examples. The subject is timely, as the performance of networks is recognized as an important topic in the study of complex systems with applications in energy, material, and information grid transport (epitomized by the internet). The book
