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Autore	Schott Rene
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homogeneous random walks on finite graphs; 5. Random Graphs; 5.1 Preliminaries; 5.2 Cycles in Random Graphs; 5.3 Convergence of Moments; 6. Graph Theory and Quantum Probability; 6.1 Concepts; 6.1.1 Operators as random variables; 6.1.2 Operators as adjacency matrices; 6.2 From Graphs to Quantum Random Variables; 6.2.1 Nilpotent adjacency operators in infinite spaces; 6.2.2 Decomposition of nilpotent adjacency operators; 6.3 Connected Components in Graph Processes; 6.3.1 Algebraic preliminaries; 6.3.2 Connected components 6.3.2.1 (k, d)-components6.3.3 Second quantization of graph processes; 7. Geometric Graph Processes; 7.1 Preliminaries; 7.2 Dynamic Graph Processes; 7.2.1 Vertex degrees in Gn; 7.2.2 Energy and Laplacian energy of geometric graphs; 7.2.3 Convergence conditions and a limit theorem; 7.3 Time-Homogeneous Walks on Random Geometric Graphs; Probability on Algebraic Structures; 8. Time-Homogeneous Random Walks; 8.1 sym and Random Walks on Hypercubes; 8.2 Multiplicative Walks on C p,q; 8.2.1 Walks on directed hypercubes; 8.2.2 Random walks on directed hypercubes with loops 8.2.3 Properties of multiplicative walks8.3 Induced Additive Walks on C p,q; 8.3.1 Variance of N; 8.3.2 Variance of; 8.3.3 Central limit theorems; 9. Dynamic Walks in Clifford Algebras; 9.1 Preliminaries; 9.2 Expectation; 9.3 Limit Theorems; 9.3.1 Conditions for convergence; 9.3.2 Induced additive walks; 9.3.3 Central limit theorem; 10. Iterated Stochastic Integrals; 10.1 Preliminaries; 10.2 Stochastic Integrals in; 10.3 Graph-Theoretic Iterated Stochastic Integrals; 10.3.1 Functions on partitions; 10.3.2 The Clifford evolution matrix; 10.3.3 Orthogonal polynomials
11. Partition-Dependent Stochastic Measures

Sommario/riassunto

This pioneering book presents a study of the interrelationships among operator calculus, graph theory, and quantum probability in a unified manner, with significant emphasis on symbolic computations and an eye toward applications in computer science. Presented in this book are new methods, built on the algebraic framework of Clifford algebras, for tackling important real world problems related, but not limited to, wireless communications, neural networks, electrical circuits, transportation, and the world wide web. Examples are put forward in Mathematica throughout the book, together with pack