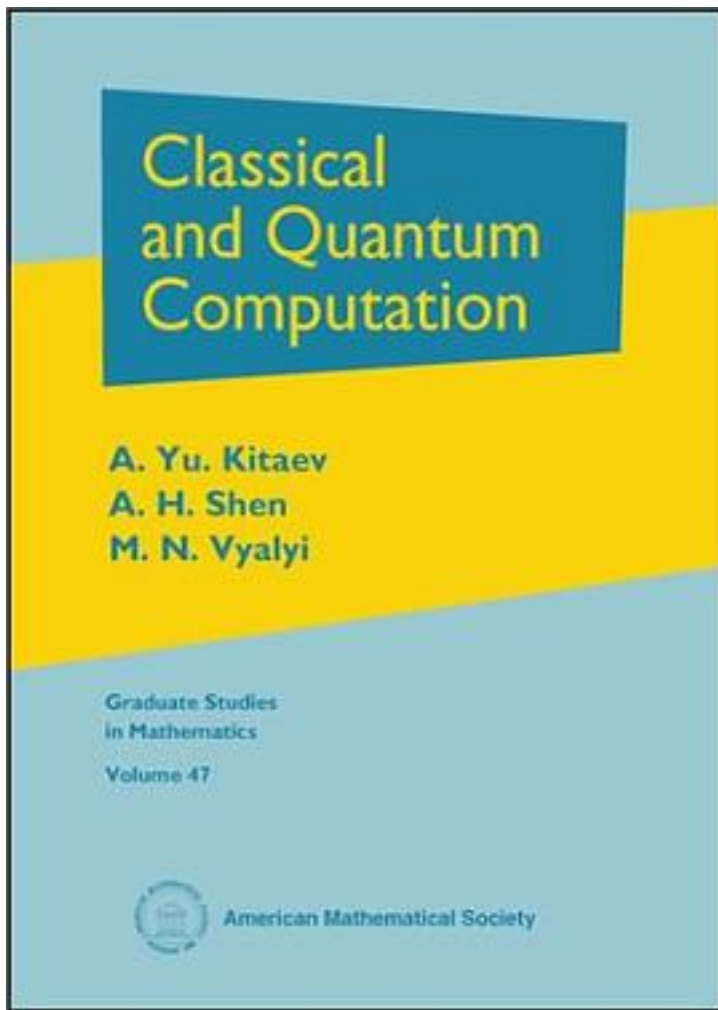


Classical and Quantum Computation



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出版者:Amer Mathematical Society

出版时间:2002

装帧:Pap

isbn:9780821832295

This book is an introduction to a new rapidly developing theory of quantum

computing. It begins with the basics of classical theory of computation: Turing machines, Boolean circuits, parallel algorithms, probabilistic computation, NP-complete problems, and the idea of complexity of an algorithm. The second part of the book provides an exposition of quantum computation theory. It starts with the introduction of general quantum formalism (pure states, density matrices, and superoperators), universal gate sets and approximation theorems. Then the authors study various quantum computation algorithms: Grover's algorithm, Shor's factoring algorithm, and the Abelian hidden subgroup problem. In concluding sections, several related topics are discussed (parallel quantum computation, a quantum analog of NP-completeness, and quantum error-correcting codes).

Rapid development of quantum computing started in 1994 with a stunning suggestion by Peter Shor to use quantum computation for factoring large numbers--an extremely difficult and time-consuming problem when using a conventional computer. Shor's result spawned a burst of activity in designing new algorithms and in attempting to actually build quantum computers. Currently, the progress is much more significant in the former: A sound theoretical basis of quantum computing is under development and many algorithms have been suggested.

In this concise text, the authors provide solid foundations to the theory--in particular, a careful analysis of the quantum circuit model--and cover selected topics in depth. Included are a complete proof of the Solovay-Kitaev theorem with accurate algorithm complexity bounds, approximation of unitary operators by circuits of doubly logarithmic depth. Among other interesting topics are toric codes and their relation to the anyon approach to quantum computing.

作者介绍:

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标签

量子计算

Quantum_Computation

Kitaev

计算理论

物理

计算机科学

第三阶段

Yu.

评论

Kitaev神人无法触及，这本有点太数学化，有时间再看看。

Kitaev 的量子计算教材, 难度很大而且叙述较为跳跃, 习题很多是经典工作, 不少内容的处理都是优化后的结果, 可惜的是不少结果不算最新的.

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书评

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