Wang, Shiqi; Zhang, Kejia; Zhang, Linmeng
Research on the decomposition of unitary operators in quantum circuits. (Chinese. English summary) Zbl 07366281
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Summary: As we know, the quantum circuit constructed by the basic quantum logic gates plays a key role in the realization of quantum computation. In the view of operator theory, quantum logic gates are described by unitary operators, studying the decomposition of any unitary operators in quantum circuit is significant to analyze quantum circuit optimization. In this paper, we firstly expand the line identity relation between Pauli gate, Hadamard gate and rotation operator with the analysis of the Pauli gate and Hadamard gate. Then some novel and intuitive proofs to the decomposition results of any single-qubit gate in quantum circuit are proposed based on the specific line identity relation above. These results will be helpful to further research on the mathematical characterization of quantum computation.

MSC:
81P65 Quantum gates
81P68 Quantum computation

Keywords:
Pauli gate; Hadamard gate; rotation operator; the identity in quantum circuit; the decomposition of single qubit gate

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