Simulating quantum computers with Mathematica: QDENSITY *et al.*

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Abstract

Symbolic algebra packages, such as Mathematica, provide a versatile framework to study a number of problems in quantum mechanics. They are particularly suited to study quantum problems where only a small number of qubits participate. We will describe the main ingredients of our Mathematica packages, QDENSITY [1] and QCWAVE [2], which can be used to simulate a number of well-known quantum circuits such as teleportation circuits, Grover's search algorithms and others. Aplications to quantum correction circuits and cluster state quantum computation will be outlined.

[1] QDENSITY, A Mathematica Quantum Computer simulation, B. Julia-Diaz, J. M. Burdis, and F. Tabakin, Comp. Phys. Comms, 174, 914 (2005).

[2] QCWAVE, a Mathematica quantum computer simulation update, F. Tabakin, B. Julia-Diaz, Comp. Phys. Comm. 182 (2011) 1693.

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