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Qubit-based Model for Simulation of Discrete Quantum Systems

STEVEN PEIL, U.S. Naval Observatory — We present an approach to simulating quantum computation based on a classical model developed to directly imitate discrete quantum systems. Qubits are represented as harmonic functions in a 2D vector space. Multiplication of qubit representations of different frequencies results in exponential growth of the state space similar to the tensor-product composition of qubit spaces in quantum mechanics. Individual qubits remain accessible, though entanglement imposes a demand on resources that scales exponentially with the number of entangled qubits. We demonstrate a simulation of Shor's factoring algorithm for the number 21 and discuss a simpler implementation of factoring in a classical model.

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