A mixed precision quantum-classical algorithm for solving linear systems

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Abstract

A drawback of quantum algorithms for linear systems is that they require huge quantum resources if we want to achieve an acceptable accuracy. We propose a hybrid quantum-classical algorithm that improves the accuracy and reduces the cost of the quantum solver by adding iterative refinement in mixed-precision. A first "quantum" solution is computed using the Quantum Singular Value Transformation, in low precision, and then refined in higher precision until we get a satisfying accuracy.
For this solver, we present an error and complexity analysis and first experiments using the quantum software stack myQLM.

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