

Abstract Submitted
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Plaquette Renormalization Scheme for Tensor Network States¹

LING WANG, Boston University, YING-JER KAO, National Taiwan University, ANDERS SANDVIK, Boston University — We present a method for contracting a square-lattice tensor network in two dimensions based on auxiliary tensors accomplishing successive truncation (renormalization) of the effective 8-index tensors for 2×2 plaquettes into 4-index tensors. The scheme is variational, and thus the tensors can be optimized by minimizing the energy. Test results for the quantum phase transition of the transverse-field Ising model confirm that even the smallest possible tensors (two values for each tensor index at each renormalization level) produce much better results than the simple product (mean-field) state. We also discuss several extensions of the scheme.

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