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Constrained Path Monte Carlo with Matrix Product State trial wavefunctions CHIA-MIN CHUNG, University California Irvine, MATTHEW FISHMAN, California Institute of Technology, STEVEN WHITE, University California Irvine, SHIWEI ZHANG, College of William and Mary — Constrained path Monte Carlo (CPMC) is a powerful method for simulating strongly correlated systems. By constraining the path with a trial wavefunction, CPMC circumvents the minus sign problem, but at the cost of introducing a bias. The Density Matrix Renormalization Group (DMRG) is an alternative simulation technique, which is immune to the minus sign problem, but which has an analogous "dimensionality problem" for two and three dimensions. Here we present a combination of these techniques, where we use a DMRG matrix product state as a trial wavefunction for CPMC. We demonstrate our method in two-dimensional Hubbard model, and show the comparison to DMRG alone and to CPMC with single-determinant trial functions.

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