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Applying tensor renormalization group methods to frustrated and glassy systems: advantages, limitations, and applications ZHENG ZHU, HELMUT G. KATZGRABER, Department of Physics and Astronomy, Texas A&M University — We study the thermodynamic properties of the two-dimensional Edwards-Anderson Ising spin-glass model on a square lattice using the tensor renormalization group method based on a higher-order singular-value decomposition. Our estimates of the internal energy per spin agree very well with high-precision parallel tempering Monte Carlo studies, thus illustrating that the method can, in principle, be applied to frustrated magnetic systems. In particular, we discuss the necessary tuning of parameters for convergence, memory requirements, efficiency for different types of disorder, as well as advantages and limitations in comparison to conventional multicanonical and Monte Carlo methods. Extensions to higher space dimensions, as well as applications to spin glasses in a field are explored.

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