

Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Low-temperature density matrix renormalization group using regulated polynomial expansion SHIGETOSHI SOTA, TAKAMI TOHYAMA, Yukawa Institute for Theoretical Physics, Kyoto University — We propose a new scheme of density matrix renormalization group (DMRG) for low dimensional strongly correlated electron systems at finite temperatures, which is a straightforward extension of the target-state procedure at zero temperature. In order to investigate thermodynamical properties, we employ the target state that is weighted by a Boltzmann factor [1]. Making use of a regulated polynomial expansion [2] and random sampling, we can calculate static and dynamical quantities at finite temperatures. In order to obtain good convergency in high temperature region, we need a large truncation number of the density matrix, while a necessary truncation number is small at low temperatures. The proposed method is, therefore, suitable for lower temperature region. As a demonstration of the method, we show the specific heat and dynamical current-current correlation function of the 1D Hubbard model at half filling. The DMRG results reproduce the exact digitalization results at low temperatures. [1] S. Sota and T. Tohyama, *Phys. Rev. B* **78**, 113101 (2008). [2] S. Sota and M. Itoh, *J. Phys. Soc. Jpn.* **76**, 054004 (2007).

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Date submitted: 01 Dec 2008

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