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Tensor renormalization group approach to higher dimensional fermions

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We apply the higher order tensor renormalization group to two and three dimensional lattice fermion systems. To deal with the tensor network including Grassmann numbers, higher order Grassmann tensor renormalization group (HOGTRG) is introduced. Because of its deterministic property, HOGTRG is perfectly free of the sign problem. We analyze the well-known systems such as the Grossndash;Neveu model using HOGTRG, and test the validity of the new algorithm.

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