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Z_3 symmetry-protected topological phases in SU(3) AKLT model TAKAHIRO MORIMOTO, HIROSHI UEDA, TSUTOMU MOMOI, AKIRA FURUSAKI, RIKEN — We study Z_3 symmetry-protected topological (SPT) phases in one-dimensional systems with $Z_3 \times Z_3$ symmetry. We construct MPS wavefunctions for Z_3 SPT phases by using non-trivial cocycles of the group cohomology $H^2(Z_3 \times Z_3, U(1)) = Z_3$. Their parent Hamiltonian turns out to be an SU(3) version of the AKLT model consisting of bilinear and biquadratic terms of su(3) operators in the **8** representation. We apply iDMRG method to the SU(3) bilinear-biquadratic model of general coupling constants. We determine its phase diagram in which the nontrivial Z_3 SPT phase is present for a parameter range including the point of vanishing biquadratic term as well as the SU(3) AKLT point. We find a continuous phase transition from the Z_3 SPT phase to an SU(3) dimer phase, where we obtain a central charge $c = 16/5$ from a scaling of the entanglement entropy. We also discuss that an $S = 1$ spin chain with staggered quadrupole couplings reduces to the SU(3) AKLT model in the strong coupling limit.

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