

Exact Numerical Solutions of Bose-Hubbard Model

ZHANG Dan and PAN Feng

Department of Physics, Liaoning Normal University, Dalian 116029, China

(Received: 2003-5-20; Revised:)

Abstract: Hamiltonian of a one-dimensional Bose-Hubbard model is re-formulated by using differential realization of the boson algebra. Energy matrices can then be generated systematically by using a Mathematica package. The output can be taken as the input of other diagonalization codes. As examples, exact energy eigenvalues and the corresponding wavefunctions for some cases are obtained with a Fortran diagonalization code. Phase transition of the model is analyzed.

PACS: 03.65.Fd, 67.40.Db, 05.70.Fh, 05.30.Jp

Key words: insulator, superfluid, phase transition, phase diagram

[\[Full text: PDF\]](#)

Close