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Variational Study of the Two-dimensional Hubbard Model at half-filling YUNG-CHUNG CHEN, Department of Physics, Tunghai University, Taiwan, H.C. CHIEN, Physics, National Tsing Hua University, Taiwan, CHIH-TIN SHIH, Physics, Tunghai University, Taiwan — The ground-state properties of the half-filled two-dimensional Hubbard model is systematically investigated by the variational wave function with d-wave supercondcting and anti-ferromagnetic correlations. The enhanced pairing correlation observed in the previous Gutzwiller approximation is found to be strongly suppressed by the doublon-holon and anti-ferromagnetic correlations. In order to check this result, power-Lanczos method is employed to improve the variational wave function. It is found that that pairing is not stable against anti-ferromagnetic long-range order. Possible models for the theory Gossamer superconductivity will be discussed in this paper.

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