A Variational Moments Approach to the One Dimensional Hubbard Model[1] ZHI HUA CHENG, YICK HONG CHAN, JUN HUI LIANG, Kingsborough Community College of CUNY, ERIC ASHENDORF, Brooklyn College, J.D. MANCINI, Kingsborough Community College of CUNY, V. FESSATIDIS, Fordham University, S.P. BOWEN, Chicago State University — In this work we shall study the one dimensional Hubbard model

$$H = t \sum_{<i,j>,\sigma} \left(c_{i\sigma}^\dagger c_{j\sigma} + c_{j\sigma}^\dagger c_{i\sigma} \right) + U \sum_i n_{i\uparrow} n_{i\downarrow}$$

using both a connected moments approach as well as a Lanczos tridiagonal scheme. Following the work of Eichenberger and Baeriswyl (PRB 76, 180504(R), 2007) we use a modified variational wavefunction which includes the hopping term of the Hamiltonian. Our results show a marked improvement in our estimation of the ground-state energy in the region of intermediate coupling $t/U \approx 0.1$.

[1]Zhi Hua Cheng, Yick Hong Chan, Jun Hui Liang and Eric Ashendorf are undergraduate students.

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