From UCOM potential to Shell-model and MCSM calculation
LIU LANG, T. OTSUKA, N. SHIMIZU, The University of Tokyo — The advent
of realistic nucleon-nucleon (NN) potentials has created an opportunity to investi-
gate nuclear structure starting from the first principle. In a simple approach, the
many-body state is described in a subspace spanned by some trial states, e.g. Slater
determinants. Those states cannot describe the strong short-range correlations in-
duced by the realistic NN-potential. How to treat short-ranged repulsive core? 1)
To adapt the Hamiltonian by replacing the interactoin with an effecive one. For
example, the Brueckner G-Matrix formalism. 2)To introduce the short-range repul-
sive correlations into the many-body state. A Unitary Correlation Operator Method
(UCOM) was Proposed by H. Feldmeier etc, which to a certain extend combines the
advantages of the above methods. By using UCOM interaction, shell model and
Monte Carlo Shell model calculation has been done with harmonic oscillator basis.
Many shells should be mixed, in order to be ab-initio.

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Date submitted: 01 Jul 2009   Electronic form version 1.4