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 investigate 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 induced by the realistic NN-potential. How to treat short-ranged repulsive core? 1) To adapt the Hamiltonian by replacing the interaction with an effective one. For example, the Brueckner G-Matrix formalism. 2) To introduce the short-range repulsive 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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