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Ground-state energies and charge radii of medium-mass nuclei in the unitary-model-operator approach[1] TAKAYUKI MIYAGI, TAKASHI ABE, Department of Physics, the University of Tokyo, RYOJI OKAMOTO, Senior Academy, Kyushu Institute of Technology, TAKAHARU OTSUKA, Department of Physics, the University of Tokyo — In nuclear structure theory, one of the most fundamental problems is to understand the nuclear structure based on nuclear forces. This attempt has been enabled due to the progress of the computational power and nuclear many-body approaches. However, it is difficult to apply the first-principle methods to medium-mass region, because calculations demand the huge model space as increasing the number of nucleons. The unitary-model-operator approach (UMOA) is one of the methods which can be applied to medium-mass nuclei. The essential point of the UMOA is to construct the effective Hamiltonian which does not induce the two-particle-two-hole excitations. A many-body problem is reduced to the two-body subsystem problem in an entire many-body system with the two-body effective interaction and one-body potential determined self-consistently. In this presentation, we will report the numerical results of ground-state energies and charge radii of ^{16}O, ^{40}Ca, and ^{56}Ni in the UMOA, and discuss the saturation property by comparing our results with those in the other many-body methods and also experimental data.

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