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The effect of Dirac sea and tensor coupling of omega meson in SU(2) chiral sigma model SETSUO TAMENAGA, Research Center for Nuclear Physics (RCNP), AKIHIRO HAGA, Nagoya Institute of technology, YOKO OGAWA, Research Center for Nuclear Physics (RCNP), Osaka University, HIROSHI TOKI, Research Center for Nuclear Physics (RCNP), Osaka University — The chiral sigma model provides good saturation property for nuclear matter and produces the magic number 28 by pionic correlation in finite nuclei. However, the magic number appears at N=18 instead of N=20, which seems due to the incompressibility being too large (K=650[MeV]). We take the relativistic Hartree approximation (RHA) for the nucleon propagator with chiral symmetry. However this ordinary approach remains arbitrary and the total effective potential has the instability. We propose a new chiral symmetric renormalization (NCSR) method, which includes the higher-order counter terms of sigma and pi mesons. With this renormalization scheme, we can remove both arbitrariness and divergence, and obtain a stable potential. It is also known that the incompressibility decreases around 300[MeV] in SU(2) chiral sigma model with higher-order terms. In this model s-state level locates at a good place as we expect. However the effective mass (0.85M) is too large. Therefore it is impossible to produce the magic number 20 due to the small spin-orbit splitting of d- state despite of good incompressibility. We discuss the effect of Dirac sea (NCSR and Derivative expansion) and tensor coupling for omega meson in order to solve the problem at N=20.

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