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LOCV approach and core-crust transition in neutron stars

The structural properties of neutron stars, such as its maximum mass [1] and the inner edge of crusts [2], is a subject that theoretical astrophysicists have desired to study. Theoretically, in calculating these properties of the neutron star, the nuclear symmetry energy and equation of state of nucleonic matter plays a crucial role. Thus understanding and calculation of the exact magnitude of nuclear symmetry energy using realistic nucleon- nucleon potentials is essential in order to determine the core-crust transition parameters in the neutron star [2].These show that the study of the properties of nucleonic matter at is very important in the investigation of the neutron star structure. We can obtain the nuclear symmetry energy using the lowest order constrained variational (LOCV) formalism as a microscopic approach [3], and then using this symmetry energy, we can compute the core-crust transition parameters. The LOCV method is a powerful tool for determination of the properties of the nucleonic matter at zero and finite temperatures [4-6].

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