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Beta-decay rate and beta-delayed neutron emission probability of improved gross theory[1] HIROYUKI KOURA, Advanced Science Research Center, Japan Atomic Energy Agency — A theoretical study has been carried out on beta-decay rate and beta-delayed neutron emission probability. The gross theory of the beta decay is based on an idea of the sum rule of the beta-decay strength function, and has succeeded in describing beta-decay half-lives of nuclei overall nuclear mass region. The gross theory includes not only the allowed transition as the Fermi and the Gamow-Teller, but also the first-forbidden transition. In this work, some improvements are introduced as the nuclear shell correction on nuclear level densities and the nuclear deformation for nuclear strength functions, those effects were not included in the original gross theory. The shell energy and the nuclear deformation for unmeasured nuclei are adopted from the KTUY nuclear mass formula, which is based on the spherical-basis method. Considering the properties of the integrated Fermi function, we can roughly categorized energy region of excited-state of a daughter nucleus into three regions: a highly-excited energy region, which fully affect a delayed neutron probability, a middle energy region, which is estimated to contribute the decay heat, and a region neighboring the ground-state, which determines the beta-decay rate. Some results will be given in the presentation.

[1]This work is a result of Comprehensive study of delayed-neutron yields for accurate evaluation of kinetics of high-burn up reactors entrusted to Tokyo Institute of Technology by the Ministry of Education, Culture, Sports, Science and Technology of Japan.

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