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# Theoretical analysis of deuteron-induced reactions and development of deuteron nuclear database

Since deuteron is a weakly bound system consisting of a proton and a neutron, it easily breaks up and emits a neutron through interaction with a target nucleus. Utilizing this property, intensive neutron sources using deuteron accelerators have been proposed for not only science and engineering fields but also medical applications. For design studies of such facilities, accurate and comprehensive nuclear data of deuteron-induced reactions are indispensable.
Toward evaluation of deuteron nuclear data, we have developed a code system dedicated for deuteron-induced reactions, called DEURACS. In DEURACS, breakup processes of incident deuteron are taken into account. DEURACS was so far successfully applied to analyses of production of nucleons, composite particles up to A = 4, and residual nuclei. In this talk, we will present the results of these analyses and discuss how important it is to consider the breakup processes for accurate prediction of deuteron-induced reactions.
Moreover, we have recently developed JENDL/DEU-2020, a deuteron nuclear database for Li-6,7, Be-9, and C-12,13 up to 200 MeV. DEURACS was employed for evaluation of JENDL/DEU-2020. Validation of JENDL/DEU-2020 was carried out by simulation with the Monte Carlo transport codes. As a result, the simulation using JENDL/DEU-2020 reproduced the measured thick-target neutron yields better than both simulations using the deuteron sub-library of TENDL and the reaction models implemented in the PHITS code. These validation results will also be presented.

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