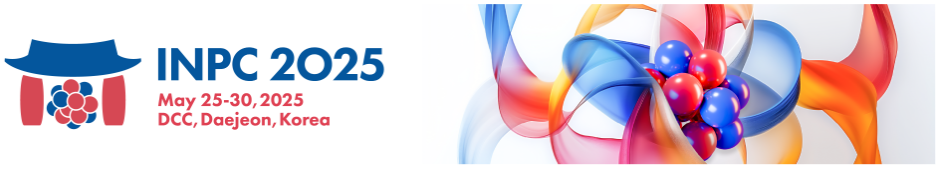

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# THE NEW VERSION OF NUCLEAR REACTION MODEL IN CNDC

The UNF code calculates fast neutron reaction data of medium heavy nuclei with incident energies from about 1 keV up to 20 MeV. The first version of the UNF code was completed in 1994. The code has been developed continually since that time and has often been used as an evaluation tool for setting up CENDL and for analyzing the measurements of fissile materials. During these years many improvements have been made. The Hauser-Feshbach model with the width fluctuation correlation is a very successful theory used for low incident energies. With the increasing of incident energy, the pre-equilibrium mechanism needs to be involved by using angular momentum dependent exciton model.

Now, the new version of UNF extends its capabilities with an incident neutron energy range from 1 keV to 30 MeV. It now supports four-step particle emissions, encompassing a total of 57 reaction channels and 28 residual nuclei. The model includes advanced optical potential models, such as BG, KD, TMP (nonlocal), CTOM, and SKC17. For direct reaction modeling, it integrates DWUCK and ECIS. Level density is modeled using CTM, BSFG, GFL, and RHB, while the GDR model supports SLO, MLO, SMLO, and RHB. Additionally, the model includes multipole fission barriers based on the RHB approach. An automatic parameter optimization system powered by MINUIT enhances accuracy and efficiency in parameter adjustments.

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