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Nuclear reaction modeling for energy applications TOSHIHIKO KAWANO, PATRICK TALOU, Los Alamos National Laboratory — We discuss how nuclear reaction theories are utilized in the nuclear energy applications. The neutron-induced compound nuclear reactions, which take place from in the sub-eV energy range up to tens of MeV, are the most important mechanism to analyze the experimental data, to predict unknown reaction cross-sections, to evaluate the nuclear data for databases such as ENDF (Evaluated Nuclear Data File), and (4) to reduce the uncertainties. To improve the predictive-power of nuclear reaction theories in future, further development of compound nuclear reaction theories for fission and radiative capture processes is crucial, since these reaction cross sections are especially important for nuclear technology. An acceptable accuracy of these cross-sections has been achieved only if they were experimentally confirmed. However, the compound reaction theory is getting more important nowadays as many rare nuclides, such as americium, are involved in applications. We outline future challenges of nuclear reaction modeling in the GNASH/McGNASH code, which may yield great improvements in prediction of nuclear reaction cross-sections.

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