

Core modeling of the research reactor IEA-R1 with the MCNP-6.2 computational code

Antonio Carlos Iglesias Rodrigues, Tufic Madi Filho, Davilson Gomes da Silva

Nuclear and Energy Research Institute (IPEN-CNEN/SP), São Paulo, Brazil

The objective of this work is to develop the modeling of the IEA-R1 reactor core with the MCNP-6.2 computational code that was recently acquired. The main advantage of this new version of the code is the performance of burnup calculations of the fuel elements. This modeling will be valid by comparing the thermal and epithermal neutron flux obtained in the calculations with the MCNP-6.2 and the fluxes measured with the activation of gold foils (Au) with and without cadmium coating (Cd) in the same positions of irradiation and, with the same arrangement of fuel elements in the reactor core.

After the validation of this model, the idea is to use it for the burnup calculations of the fuel elements that are fundamental for a correct management of the reactor core. Currently, the management of the core is carried out by deterministic codes that are very old and have many approximations leading to very conservative results, for example, TWODB, HAMMER, and CITATION.

Keywords: Neutron flow, burnup of the fuel element, MCNP-6.2