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OECD/NEA Data Bank, Boulogne-Billancourt (Paris), France

Source Terms and Radiation Shielding for Spent Fuel Transportation and Storage Applications (2000 EUR)

One of the unique features of the SCALE code system is the flexibility of assembling different SCALE codes or sequences to solve complex problems. Transportation and storage of spent fuel require a computational tool set to characterize both the spent fuel source terms and the doses for containers used to transport or store the fuel. Spent fuel is a complex neutron and photon source that can be well characterized using the ORIGEN code in SCALE. Additionally, ORIGEN can be used to characterize the radioactive sources resulting from activation of non-fissile materials and components in a nuclear reactor, such as the pressure vessel. The variety of source terms generated with ORIGEN can be used for shielding analyses with the MAVRIC sequence. MAVRIC can estimate particle fluxes and dose rates outside of containers, to ensure that the safety requirements for transportation, storage and ultimate disposal of spent fuel or activated materials are met.

This one-week course will first cover the use of ORIGEN for isotopic depletion, decay and radiation source-terms calculation, generation of ORIGEN activation libraries, and the use of the ORIGAMI tool for quick calculation of spent fuel sources. The next part of the course will focus on MAVRIC, including: building complex 3D models (materials and compositions); using a connection to the ORIGEN libraries to model simple radioactive sources; importing complex ORIGEN sources; and, calculating neutron fluxes to create ORIGEN activation libraries. Additionally, the advanced variance reduction tools for deep penetration problems, CADIS and FW-CADIS, that are the foundation of MAVRIC will be covered. This class uses the Fulcrum user interface for interactive model setup, visualization, computation, and output review.

Previous experience with the SCALE/KENO geometry is required.