

Nuclear Data Benchmark for Sodium Voided Reactivity Worth with Improved Neutronics simulation Method

Go CHIBA

Nuclear Science and Engineering Directorate, Japan Atomic Energy Agency,
Tokai-mura, Naka-gun, Ibaraki-ken, 319-1195
e-mail : chiba.go@jaea.go.jp

Benchmark calculations for nuclear data files, JENDL-3.3, JEFF-3.1 and ENDF/B-VII.0, were performed with the experimental data of the sodium voided reactivity worth (SVRW) obtained at the small fast critical assembly MZA. The integral data of SVRW are sensitive to the nuclear data not only of the important heavy nuclides, such as Pu-239 and U-238, but also of sodium. Hence, those data are useful to validate the sodium nuclear data.

Usefulness of the integral analyses strongly depends on the accuracy of employed numerical method. In the present benchmark calculations, to reduce ambiguity caused by lattice homogenization, heterogeneity of unit lattices is treated explicitly in the whole core transport calculations.

Large differences were observed in the calculated leakage component of SVRW between the ENDF/B-VII.0 results and the others, and the present integral analyses do not support the ENDF/B-VII.0 result. Through sensitivity analyses, it was found that these differences come from a difference in the P1 component of elastic scattering cross sections.