

Reactor Physics, Nuclear Data, Sensitivity, Uncertainty, Theoretical Study

Neutronics Calculation, Transmutation of Minor Actinides, Core Performance Evaluation, Safety Study

1. Research Field

Reactor Physics

1. Sensitivity and Uncertainty Analysis.

- Sensitivity of Light Water Reactor (LWR).
- Sensitivity of Fast Reactors (FR).

2. Micro Reactor Physics.

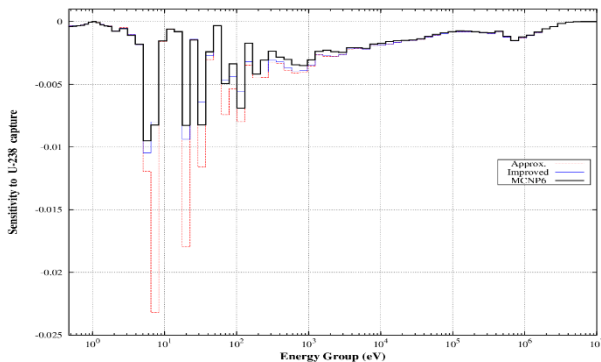
3. Core Calculation Method.

4. Transmutation of Minor Actinides using Fast Reactors

2. Achievements

Sensitivity and Uncertainty Analysis

A new method has been developed for calculating sensitivity coefficients in LWRs by taking into account the self-shielding effect of cross-sections. The method has been applied to evaluate the uncertainty of UO₂ and MOX fueled LWRs. For PWR core, we are developing uncertainty analysis method by cooperation with Mitsubishi Heavy Industry (MHI).



MA Transmutation by Fast Reactors

A new definition of MA transmutation was introduced for individual MA nuclides such as Np, Am, Cm, and the calculational method has been developed. Furthermore, a new method has been developed for the cross-section adjustment method. In this new method, systematic errors of calculation and measurement was removed by considering the ratio of the calculation to measurement of neutronic properties.

Core Calculation Method

Many calculation methods have been developed based on nodal transport method, method of characteristics and other methods to accurately evaluate core performance parameters. Methods were developed not only for light water reactors but also for fast reactors with hexagonal geometry.

Applied Codes

Many codes are used in our laboratory in neutronics calculation such as

- SRAC
- SAINT
- SCALE
- DRAGON
- MCNP6
- NJOY
- SLAROM
- SAGEP

3. Prospect

- JENDL-4.0 Library
- Perturbation Theory
- Boltzmann Equation

- ✓ Core Calculation
- ✓ Sensitivity and Uncertainty Analysis
- ✓ Accurate Computational Method

- Core Design with Improved Safety Feature
- Transmutation of Minor Actinides
- Future Advanced Core Design

For students

- ❖ Reactor Physics is basic of Nuclear Engineering.
- ❖ Make future safe reactor based on the new Reactor Physics