

# Development of a neutron resonance analysis technique for nondestructive fissile material assay and nuclear data/核分裂性物質を非破壊分析するための中性子共鳴分析法の技術開発と核データ

Friday, 15 November 2024 14:00 (30 minutes)

The Japan Atomic Energy Agency (JAEA) has been developing various non-destructive assay (NDA) techniques [1] to verify nuclear materials. However, one major challenge in NDA is measuring highly radioactive materials. To address this, neutron resonance analysis (NRA) has been proposed as a promising active neutron NDA technique. NRA combines neutron resonance transmission analysis (NRTA) [2] with neutron resonance capture analysis (NRCA) [2, 3] and the newly introduced neutron resonance fission neutron analysis (NRFNA) [4]. In an NRA system, a pulsed neutron beam, in conjunction with the neutron time-of-flight (TOF) method [2], is used to measure transmitted neutrons, capture gamma-rays, and fission neutrons from a fissile material sample. The system employs a GS20 glass scintillator for detecting transmitted neutrons, while a pulse shape discrimination (PSD) plastic scintillator is used to detect and discriminate between capture gamma-rays and fission neutrons. The positions and depths of resonance peaks or dips in the TOF spectra are determined by the neutron cross sections of nuclides and their amount in the sample. Therefore, to accurately identify and quantify fissile materials based on these spectra, the use of the evaluated nuclear data library is essential. This presentation will provide a detailed overview of the NRA project and discuss the critical role of accurate nuclear data in its success.

## References

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