**①Analysis of the Nuclear Materials Attractiveness Through New FOM Including the Nuclear Material Quantification Factor**

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⑤Nuclear material attractiveness is a methodology that evaluates utility in the production of nuclear weapons through the characteristics of nuclear materials. One of the representative methodologies for the nuclear materials attractiveness is the Figure of Merit (FOM). The FOM is a methodology developed by the Los Alamos National Lab that sets acceptance criteria for each factor, including critical mass, heat content, and dose rate, and evaluates the utility of nuclear materials in the production of nuclear weapons. In addition, the potential proliferation group’s technological capabilities are being considered through spontaneous neutrons, which can cause a pre- detonation at an unwanted time.

As above, FOM is considering the nuclear materials attractiveness from the perspective of nuclear weapons production. Nevertheless, there are opinions that the FOM methodology lacks quantitative evaluation of nuclear materials. This is because the production of Pu according to the operating period cannot be considered. Therefore, this study added a quantitative factor for nuclear materials to the existing FOM and analyzed how the attractiveness of nuclear materials changes depending on the quantity of nuclear materials.

As a method for analyzing this, first, a pressurized light water reactor was modeled through Monte Carlo N-Particle (MCNP) to calculate the production of Pu according to the operating period of the reactor. Second, the FOM was calculated through MCNP and ORIGEN-S, and as a criterion related to the quantification of nuclear materials, 1 Significant Quantity (SQ), which is a non-negligible amount for production nuclear weapons, was used. The name of the FOM newly suggested and analyzed in this study was called to FOMQ

As a result of this study, the amount of Pu generated per assembly when operating for 12 months is about 2 kg. In this case, FOM1 is 2.63, and the value of FOM1Q is 0.4. If this is expanded to the entire core, the amount of Pu is about 350 kg, and the FOM1Q value at this time is 2.34. Even for the same operating period, when the mass of nuclear material is little, the nuclear material attractiveness is 'unattractive', but when the mass increases, the nuclear material attractiveness rises to 'preferred'

Through the results of this study, it was confirmed that nuclear materials attractiveness increased with mass. This suggests that utilizing the existing FOM methodology allows for analyzing changes in attractiveness based on the quantity of nuclear materials. In the future, the reliability of this methodology will be analyzed through correlation analysis between newly developed FOM and mass.

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