

# Sensitivity Analysis of Actinide Decay Heat

## Focused on Mixed Oxide Fuel

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Nowadays, nuclear power plants in the world accumulate a vast amount of spent fuels. In Japan, the spent fuel is reprocessed and is not disposed directly. Therefore utilization of this reprocessed fuel, i.e. Mixed Oxide (MOX) Fuel, will eventually expand.

Under this background, hereafter, the MOX fuel will play a role of greater importance. It is, then, essential to understand the characteristics of the spent MOX fuel. Above all, the radioactivity and decay power of spent MOX fuel are very crucial in storage or disposal term. In this work, the uncertainty of the fission-product and actinide decay heats was studied introduced by the uncertainty of the nuclear data and of the prediction accuracy of isotopic generation.

Between 100 and 1,000 years after discharge of the spent MOX fuel, the total decay heat is dominated by Am-241. The amount of Am-241 at reactor shutdown, however, is relatively small. Therefore we should pay attention to the generation of Pu-241 which decays into Am-241 with the half-life of 14.35 years. The amount of Pu-241, moreover, has a close relation to the capture cross section of Pu-240. Fig.1 shows the uncertainty of the FP and actinide decay heats introduced by the uncertainty of the one-group capture cross section of Pu-240. The dip of about  $10^4$  year results from reduction of Pu-240. This kind of the sensitivity study has been thoroughly performed.

On the other point of view, the uncertainty of the burnup calculation is discussed. At 100 year after discharge, for example, 7% error of the decay heat will be introduced by 10% uncertainty of Pu-241 generation calculation through Am-241 production. It is shown in Fig.2.

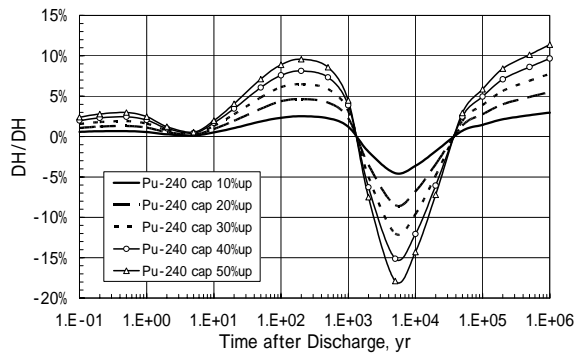


Fig.1 Uncertainty of the total FP and actinide decay heats introduced by uncertainty of the one-group capture cross section of Pu-240

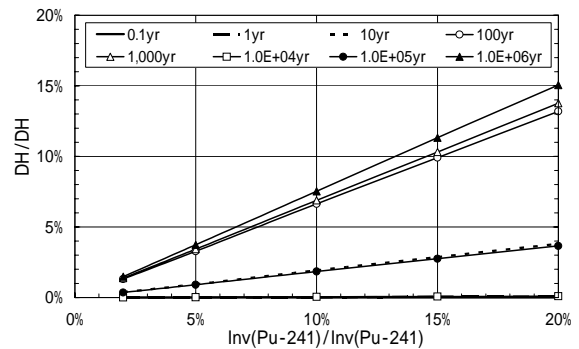


Fig.2 Uncertainty of the FP and actinide decay heats introduced by uncertainty of the prediction accuracy of isotopic generation of Pu-241