Uncertainty Analysis System Using MACCS2

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Abstract

An uncertainty analysis system using MACCS2 was developed to evaluate environmental parameters related to probabilistic safety analysis for Japan's nuclear fuel recycle facility. The system was tested using site-specific data for Japan's nuclear fuel recycle facility and reasonable results were obtained. Further validation through comparison with other studies will be completed for both the system and the input parameters.

Features of this system are:

(1) The calculation system consists of LHS(*1), MACCS2, COMIDA2, and SPOP(*2) codes. The interface program was developed to; transfer data files between codes, run the required codes for the number of uncertainty data sets generated, and retrieve necessary data for statistical processing from output files.

(2) The Windows® interface simplifies the setting of uncertain input parameters (upper / lower / distribution) and the generation of resultant graphs and tables.

(3) Uncertain input parameters and their data are determined by referring to statistics published in Japan, NUREG/CR-4551, IAEA No. 364, et al. Meteorological data were originally provided by the nuclear fuel recycle facility.

(4) Resulting doses are evaluated using uncertainty factor (UF), mean uncertainty coefficient (MUC)(*3), and CCDF for uncertainty analysis, and Pearson's correlation coefficient (PAER), Spearman' s correlation coefficient (SPEA), partial correlation coefficient (PCC), partial rank correlation coefficient (PRCC), and scatter diagram for sensitivity analysis.

(Note: *1 NUREG/CR-3624 (1984), *2 EUR1392EN (1992), *3 Proceedings Workshop on Expert Judgment and Accident Consequence Uncertainty Analysis (COSYMA) (1999)).