# Uncertainty propagation in neutron activation cross section measurement using Monte Carlo and unscented transform methods

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Data uncertainties and their covariances play an important role in quantifying the uncertainties in the evaluated data. Most frequent used method for uncertainty propagation is deterministic first order sensitivity analysis method (also known as sandwich formula) which is applicable when the joint probability density function of the random input parameters are identified completely by the mean and covariance. Generally, first order sensitivity analysis method is based on the a first-order approximation of Taylor series expansion of the function of the input parameters. It works well and gives satisfactory results for most smooth non-linear functions, with relatively small uncertainties.

Monte Carlo method is a stochastic approach that relies upon repeated random sampling to obtain numerical results for modelling uncertainty. It also gives the probability distribution of the cross section that contains more information than mean and standard deviation value. On the contrary, calculations are simple in deterministic method of Unscented Transform and produces better results for error propagation in non-linear case. We present the application of Monte Carlo method and Unscented Transform method to error propagation of neutron activation cross section measurement as an alternate approach to first order sensitivity analysis method.