

Covariance Evaluation of Self-Shielding Factor and Its Temperature Gradient for Uncertainty Evaluation of Doppler Reactivity

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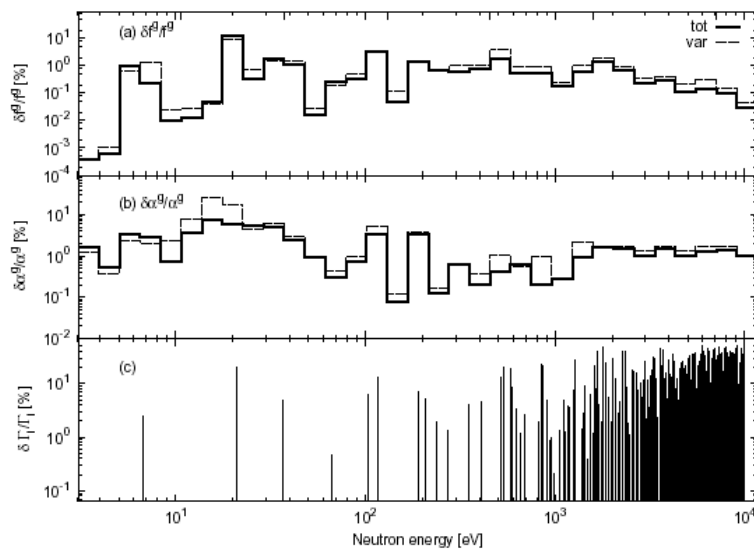
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Covariances of the self-shielding factor and its temperature gradient for the uranium-238 neutron capture reaction have been evaluated from the resonance parameter covariance matrix based on the sensitivity coefficients of the self-shielding factor and its temperature gradient to the resonance parameters. The resonance parameters and their covariance matrix for uranium-238 were taken from JENDL-3.3, while the sensitivity coefficients were calculated by varying resonance parameters and temperature. A set of computer code modules has been developed for calculation of the sensitivity coefficients at numerous resonance levels. The present result shows that the correlation among resonance parameters yields a substantial contribution to the standard deviations of the self-shielding factor and its temperature gradient. In addition to the standard deviations of these quantities, their correlation matrices in the JFS-3 70 group structure are also obtained.



Figure

(a) Standard deviation in self-shielding factor for uranium-238 neutron capture reaction ($T=800$ K, $\sigma_b=37$ barn). "tot" gives the contribution of both variances and covariances of all resonance parameters. "var" is the same as "tot", except that covariances are

not considered. (b) Same as (a), however for temperature gradient $\delta\alpha/\alpha$ (c) Relative standard deviation of resonance widths compiled in JENDL-3.3.