Regression Analysis for a Bottom-Up Approach to Analyzing Delayed Fission Gamma Yields

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We present a regression analysis that describes the yield of gamma rays emitted by fission in the time interval from 20 to 960 ns from the fission event. Our analysis is based on experimental data acquired from neutron-induced fission of U^{235} and Pu^{239}. Our model was devised by first performing a regression analysis to determine the general shape of the raw data. This analysis led us to choose the generalized gamma function as the fitting surface. The parameters were then determined by minimizing the χ^2 statistics in the two dimensions. As a result, the intensity of the emitted γ rays is described as a function of the two independent variables: energy and time.

The resulting fitted function, for both isotopes, turns out to be the product of an exponential decay in time and an Erlang distribution in energy. The findings illustrated in this paper can be used to simulate gamma ray de-excitation from fission in Monte Carlo codes. We are working on implementing this formulation in the MCNP-PoliMi code.

*** My Biblio ***

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