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Neutron Spectrum and Reaction Rate Calculations

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The neutron slowing down spectrum and reaction-rate ratios of the ^{252}Cf spontaneous fission source in moderating media are calculated using the ANSIN one-dimensional transport code. In these calculations the ANSIN-C version is used with the UKNDL 37 group structure cross sections set derived from the GALAXY processing code. The ANSIN code is run on the IBM 360 machine. The effects of the number of mesh intervals, degrees of approximation, irradiation facility geometry and moderating materials are studied in detail to choose the optimal neutron spectrum characterization by computation. In the present calculations the effects of the S_4, S_8 and S_{16} approximations are studied only with the isotropic scattering, P_0, since the cross sections with higher order components are not available but has been asked for. The comparison based on the calculations made with the $S_{16}P_0$, S_8P_0 and S_4P_0 approximations shows that the variation of the ratio $S_{16}P_0/S_8P_0$ is about 2.5% over the 37-group energy range, while that of the ratio S_8P_0/S_4P_0 is about 6% in the same enrgy range. In the reaction-rate calculation, 12 reaction-rate ratios were calculated. All reaction cross sections were taken from the Evaluated Nuclear Data File (ENDF/B-IV) Library. The original 620 group structure data set was reduced to 37 group structure by using a computer program .