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TART CALCULATIONS USING THE NEW 2021 ENERGY GROUP CROSS SECTION
LIBRARY COMPARED WITH B. CZIRR'S RESONANCE SELF-SHIELDING EXPERIMENTS

L. Bacon

November 13, 1973

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TART CALCULATIONS USING THE NEW 2021 ENERGY GROUP CROSS SECTION LIBRARY
COMPARED WITH B. CZIRR'S RESONANCE SELF-SHIELDING EXPERIMENTS

BACKGROUND

In May 1972, we presented a comparison between B. Czirr's flat plate resonance self-shielding experimental data and calculations for the same geometry using the standard 176-energy-group TART neutron Monte Carlo code.* In the energy ranges where the ^{235}U and ^{239}Pu cross sections have large resonances, the comparison showed substantial differences. The assumption was made that this difference was due to the relatively poor energy definition in the resonance regions.

Subsequently a 2021-energy-group cross section library was prepared by E. Plechaty with sufficient energy definition in the lower energy range to resolve the known resonances in ^{239}Pu and ^{235}U cross sections. R. Howerton prepared the evaluated cross section library for this set of energy groups.

CALCULATIONS

Calculations were run using this new library and the same geometry input as before. The results are somewhat ambiguous. The lower energy ranges appear to agree better with experimental data for small areal densities but disagree more as the areal density increases. The results are shown in Figs. 1-11 for ^{235}U and Figs. 12-20 for ^{239}Pu comparing the 2021 energy group calculations with the data from our previous memo. The code is called TARTM. The cross-section library is called T-T-30L and can be obtained from public photostore, .999998:PUB:T DIV or from tape DE 604.

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*Unclassified B-Division memorandum: L. Bacon, "A Comparison of Experimental Data from Energy-Dependent Resonance Self-Shielding Factors for U^{235} and Pu^{239} with calculations from TART, a Monte Carlo Neutron Transport Code".

Fig. 1. Energy group 0.464 - 1.0 eV (^{235}U experiments).

Fig. 2. Energy group 1.0 - 2.15 eV. (^{235}U experiments).

Fig. 3. Energy group 2.15 - 4.64 eV (²³⁵U experiments).

Fig. 4. Energy group 4.64 - 10.0 eV (^{235}U experiments).

Fig. 5. Energy group 10.0 - 21.5 eV (²³⁵U experiments).

Fig. 6. Energy group 21.5 - 46.4 eV (²³⁵U experiments).

Fig. 7. Energy group 46.4 - 100 eV (²³⁵U experiments).

Fig. 8. - Energy group 100 - 215 eV (²³⁵U experiments).

Fig. 9. Energy group 215 - 464 eV (²³⁵U experiments).

Fig. 10. Energy group 464 - 1000 eV (^{235}U experiments).

Fig. 11. Energy group 1000 - 2150 eV (^{235}U experiments).

Fig. 12. Energy group 2.15 - 4.64 eV (^{239}Pu experiments).

Fig. 13. Energy group 4.64 - 10.0 eV (²³⁹Pu experiments).

Fig. 14. Energy group 10.0 - 21.5 eV (^{239}Pu experiments).

Fig. 15. Energy group 21.5 - 46.4 eV (^{239}Pu experiments).

Fig. 16. Energy group 46.4 - 100 eV (^{239}Pu experiments).

Fig. 17. Energy group 100 - 215 eV (^{239}Pu experiments).

Fig. 18. Energy group 215 - 464 eV (²³⁹Pu experiments).

Fig. 19. Energy group 464 - 1000 eV (^{239}Pu experiments).

Fig. 20. Energy group 1 - 10 keV (^{239}Pu experiments).

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