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Computer Code Abstracts

AGN-GAM

1. Name of Code: AGN-GAM (an IBM 7090/94 code to calculate spectra and group constants).
2. Computer for which Code is Designed: IBM 7090/94.
3. Nature of Physical Problem Solved: AGN-GAM calculates the subgroup fluxes and current terms from a solution of the P_1 or B_1 equations. The P_1 equations incorporate both volume and surface sources, allowing spectral calculations in reflector regions. Other spectral options are flux known, current term calculated, and both flux and current terms known. The age for the material is obtained from a second-moments calculation. The method of Adler, Hinman, and Nordheim is used to calculate resonance absorption and fission cross sections. Multigroup constants are generated by spectral averaging over the subgroups.
4. Method of Solution: Multigroup theory.
5. Restrictions on the Complexity of the Problem: 32 fast groups, 33 groups down scatter, in the output matrices.
6. Typical Running Time: 1 min.
7. Unusual Features of the Program: Punched output for Los Alamos S_n codes, ZOOM, PDQ, etc.
8. Related and Auxiliary Programs: Library tape (75 subgroups) employing 180 materials; programs to update the library tape.
9. Status: In production.
10. *References*:
    [1]T. P. Wilcox and S. T. Perkins, "AGN-GAM, an IBM 7090 Code to Calculate Spectra and Multigroup Constants," AGN-TM-407, Aerojet-General Nucleonics, San Ramon, California (April 1965).
11. Machine Requirements: 32K IBM 7090/94 with 6 tape units.
12. Programming Language Used: FORTRAN-II (100%).
13. Operating System or Monitor under which Program is Executed: Standard IBM FORTRAN-II monitor.
14. Material Available through Argonne Code Center:
    a) FORTRAN-II source deck and sample problem
    b) Library tape
    c) Programs to update library tape
    d) Reference document

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AGN-SIGMA

1. Name of code: AGN-SIGMA
2. Computer for which program is designed: IBM-7090/94
3. Nature of physical problem solved: AGN-SIGMA calculates the Legendre components of the multigroup transfer matrices $\sigma_{\ell g \to g+n}$ for fast neutrons. Reactions considered are elastic scattering, inelastic scattering (level excitation and the evaporation model), and the following five decay modes for the $(n, 2n)$ reaction: $A(n, n_1)A^*(n_2)(A\text{-}1)^*$, 3- and 4-body phase space model, evaporation model, and the cluster model. All nuclear levels involved in the transitions are discrete. The code may also be used to calculate group averaged cross sections as well as manipulate, e.g., add, multiply, etc., the output matrices. The neutron spectrum may be a combination of fission and $1/E$ or arbitrary input data.
4. Method of solution: All integrations are performed by an iterative Simpson's rule. The transfer cross sections $\sigma_{\ell g \to g+n}$ (given g, n, all ℓ) are calculated concurrently by series-parallel passing through the integration scheme. Subranges on the integrations are specified between all input data points.
5. Restrictions on the complexity of the problem: 100 groups, 50 groups down scatter and the transfer matrices calculated up through the fifth degree (except for the evaporation model which is isotropic). The center-of-mass differential cross section is expressed by a Legendre expansion up through the tenth degree.
6. Typical running time: four minutes to calculate the P_1 elastic scattering matrices for 66 groups, 2 groups down scatter and cross section data at 66 energy points with a P_6 expansion of the differential cross section.
7. Unusual features of the code: Both printed and punched output.
8. Status: In production.
9. *References:* S. T. Perkins, D. W. Thompson, and P. J. DuBois, "Users Manual for AGN-SIGMA: A Code to Calculate the Legendre Components of the Multigroup Transfer Matrices and the Group Cross Sections," AN-1447 (October 1965).
10. Machine requirements: 32K IBM 7090/94; 4-11 tape units, depending upon the specified value of ℓ.
11. Programming language used: FORTRAN II
12. Operating System or Monitor under which program is executed: Standard IBM FORTRAN II monitor.