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Computer Code Abstracts

CCA - 93

1. Name of Code: TYCHE III
2. Computer for which Code is Designed: IBM 7094;
   Programing System: FORTRAN/FAP
3. Nature of Problem Solved: TYCHE III is a Monte Carlo code designed to find the second, fourth and sixth moments of the neutron slowing-down density distribution in an infinite homogeneous medium. Use is made of analytic techniques to simplify the description of the neutron history in space; consequently, only the angle of scattering and the energy loss at each collision are needed to find the moments. The moments are found by use of recursion relations which allow the higher moments to be found in essentially the same time as the second. Neutron weights are used to avoid the termination of a history by absorption and to minimize the running time. Provisions are made for restart of non-converged problems, graphical displays of the moments and average fission energy as a function of the number of sets of histories and calculation of the correction to flux moments.
4. Restrictions on the Complexity of the Problem: No more than 1200 points can be used for the energy grid, 5 elements and 150 sets of anisotropic scattering coefficient sets per element.
5. Typical Running Time: 2000 histories/min in predominantly hydrogeneous media and about 350 in carbon on an IBM 7094.
6. Present Status: In use.
7. *References:*

[1]R. A. Blaine, "TYCHE, A Monte Carlo Slowing Down Code," NAA-SR-7357 (June, 1962).

[2]R. A. Blaine, "Improvements to the TYCHE Moments Code and Operating Instructions for TYCHE III," NAA-SR-MEMO-9802 (May, 1964).

[3]R. A. Blaine, "ISRCH, A Binary Search FORTRAN Function Subprogram," NAA-SR-MEMO-9721 (April, 1964).

[4]M. Hoffman and W. A. Rhoades, "AICRT 3, A General Code for the Display of Digital Data," NAA-SR-MEMO-9069 (October, 1963).

8. Material Available through Argonne Code Center:
   a. Code Abstract
   b. FORTRAN-FAP Source Deck
   c. Binary Library
   d. Sample Problems
   e. Reference Reports (4)

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CCA - 104

1. Name of Code: PRISM
2. Computer for which Code is Designed and others upon which it is Operable: IBM 7094
3. Nature of Physical Problem Solved: PRISM calculates multigroup microscopic inelastic- and elastic-scattering transfer matrices. For the case of inelastic scattering, the bound-energy levels of the target nucleus are treated as discrete when both the levels and their probabilities of excitation as functions of the incident neutron energy are known. When such detailed information is lacking, the calculation is based on the Weisskopf evaporation model. Elastic scattering is treated as the special case of inelastic scattering for which there is a single discrete energy level with zero threshold energy.
4. Method of Solution:
5. Restrictions on the Complexity of the Problem: 60 groups; 59 downscatter
6. Typical Running Time: One minute for both the elastic and inelastic matrices for 18 groups with 5 groups downscatter.
7. Unusual Features of the Program: PRISM was developed under the Atomics International

automated cross-section program and is intended to operate with the Atomics International microscopic neutron cross-section tape.

8. Related and Auxiliary Programs:
   a. PRISM requires the neutron microscopic cross-section binary master tape generated by the MOMUS code.
   b. PRISM is closely related to GRAVE, the group-averaging code and will be incorporated therein.
   c. Required cross-section input data can be prepared by the MALINDA code.
9. Status: In production.
10. *References:*

[1]B. D. O'Reilly, D. W. Roeder and V. Luco, "PRISM, A FORTRAN Code for the Preparation of Multigroup Inelastic and Elastic Scattering Transfer Matrices," NAA-SR-MEMO-9055, (September, 1964).

[2]R. A. Blaine, "MOMUS, A Program to Construct, Up-Date and Modify the Neutron Microscopic Cross Section Master Tape," NAA-SR-MEMO-8823, (August, 1963).

[3]D. W. Roeder, "MALINDA: Manipulation and Listing of Nuclear Data," NAA-SR-MEMO-10008, (June, 1964).

11. Machine Requirements: 32 K, IBM 7094
12. Programing Languages Used: FORTRAN II (95%) and FAP (5%)
13. Operating System or Monitor under which Program is Executed:
    Standard IBM FORTRAN monitor.
14. Any other Programing or Operating Information or Restrictions: None.
15. Material Available:
    a. PRISM source deck (2000 cards)
    b. ABSTRACT
    c. PRISM document

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CCA - 105

1. Name of Code: MOMUS and Atomics International Microscopic Cross-Section Library
2. Computer for which Code is Designed and others upon which it is Operable: IBM 7094
3. Nature of Physical Problem Solved: MOMUS is the program used to construct and maintain the neutron cross-section master tape developed under the Atomics International automated cross-section program. The library contains 21 elements with data for 11 parameters in the range 0.001 eV to 10 MeV. MOMUS will perform the following tasks:
   a. Make the binary master tape from cards.
   b. List selected elements.
   c. Update—add, correct and replace any data.
   d. Make a short tape containing selected elements.
   e. Provide graphical display of selected data.
   f. Punch microscopic data.
4. Method of Solution:
5. Restrictions on the Complexity of the Problem: Parameters are tabulated at 90 uniform points in energy per decade for a total of 901 points.
6. Typical Running Time:
   a. Ten minutes for graphical display of all parameters of all elements.
   b. One-half minute to list one element.
   c. Two minutes for additions or corrections with checking.
7. Unusual Features of the Program: MOMUS is written in such a way that each subroutine performs a specific task. Thus for each option, the main program calls the required routines in the proper order. This philosophy makes program modification quite easy.
8. Related and Auxiliary Programs: The neutron master tape is used by:
   a. GRAVE, the group-averaging code.
   b. PRISM, the inelastic- and elastic-scattering matrices code.
   c. PANCAKES, a spectrum iteration code based on FAIM.
9. Status: In production.
10. *References:*

[1]R. A. Blaine, "MOMUS, A Program to Construct, Up-Date and Modify the Neutron Microscopic Cross Section Master Tape," NAA-SR-MEMO-8823, (August, 1963).

[2]R. A. Blaine, Atomics International Letter "Modifications to MOMUS," dated October 21, 1964.

[3]M. Hoffman and W. A. Rhoades, "AICRT 3, A General Code for Display of Digital Data," NAA-SR-MEMO-9096, (October, 1963).

11. Machine Requirements: 32 K, IBM 7094; SC-4020 graphical display device.