Computer Code Abstracts

PARTI

1. Name or Designation of Program: PARTI (Pronounced "party").
2. Computer for Which Program is Designed and Others Upon Which it is Operable: Direct Couple IBM 7040-7094, CDC-6500.
3. Programming Language Used: Fortran IV.
4. Nature of Physical Problem Solved: PARTI is a group collapsing code which determines the optimum discrete representation of a variable for subsequent repetitive calculations.
5. Method of Solution: PARTI uses the results from an initial detailed calculation (such as a slowing down calculation for an energy-dependent flux application) and reduces the corresponding space and/or energy structure to an optimal few-interval and/or few-group representation in accordance with the minimization of an objective response function. This minimization is attained employing a method of steepest descent in piece-wise constant, non-convex, multidimensional phase space.
6. Restrictions on the Complexity of the Problem: PARTI will optimize the discrete representation of an arbitrary function of one or two independent variables. The present program storage allocation permits up to eighty nodes for each coordinate of a detailed representation and allows collapsing up to forty nodes for each coordinate of the reduced representation.
7. Related and Auxiliary Programs: None. However, PARTI may be considered to be an auxiliary program to almost any neutron diffusion theory or neutron transport program.
8. Typical Running Time: The running time is strongly dependent upon the number of groups treated and regularity of the function of interest. Running times of typical cases have seldom exceeded 10 sec.
9. Unusual Features of the Program: This is the only computer program known to the authors which performs group or mesh collapsing in an optimal sense.
10. Machine Requirements: 32K Core storage and a random number generator.
11. Operating System or Monitor Under Which Program is Executed: IBSYS (IBM-7904), SCOPE (CDC-6500).
12. Any Other Programming or Operating Information or Restrictions: A random number generator with the function name RANF (X) is used.
13. *References*:

[1]A. A. HARMS and N. J. McCORMICK, *Trans. Am. Nucl. Soc.*, **11**, 527 (1968).

[2]A. A. HARMS and A. L. BABB, *Trans. Am. Nucl. Soc.*, **12**, 143 (1969).

[3]A. A. HARMS, "Variable Phase-Space Neutron Transport Analysis," PhD dissertation, University of Washington (1969).

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XSDRN

A Discrete Ordinates Spectral Averaging Code

1. Name of Code: XSDRN.
2. Computer for Which Code is Designed: XSDRN is designed to use computers in the IBM-360 series with a 512K byte directly addressable storage. A special version of the code is available which makes effective use of the bulk storage on the ORNL 360/75. (Present 123 group cross-section library tapes need the 512K byte storage for efficient execution, but could be made to operate on a smaller machine through various out-of-core storage capabilities.) No machine language programming is required.
3. Programming Language Used: The version of XSDRN for the IBM-360-65 uses IBM H-level Fortran and will execute directly on the 360/75. A version which makes use of the ~500K word bulk storage on the ORNL 360/75 needs one machine language routine.
4. Problems Solved: XSDRN uses the Nordheim integral treatment, narrow resonance, or infinite mass approximation to process resonance data on a master cross-section library and thus obtain microscopic fine-group cross sections for a nuclide. The code will then use these cross sections in an independent one dimensional calculation (slab, spherical, or cylindrical geometry) to solve for fluxes, eigenvalues, critical dimensions, etc., using discrete ordinates, diffusion, or an infinite