NUCLEAR SCIENCE AND ENGINEERING: 30, 312-313 (1967)

Computer Code Abstracts

RESQ2

1. Name or Designation of Program: RESQ2, A Combined Analytic-Monte Carlo Calculation of Resonance Absorption Based on Superposition.
2. Computer for Which Program is Designed and Programming Languages Used: The program was originally written in FORTRAN II, then FORTRAN IV for the Philco-2000 computer. It has been converted to the CDC-6600 using FORTRAN IV and ASCENT. The input subroutines described in Ref. 2 are used in the program.
3. Nature of Physical Problem Solved: RESQ2 calculates the resonance integral in a two-dimensional, hexagonal system consisting of fuel, clad, and water with a reflecting boundary condition.
4. Method of Solution: Using superposition, the resonance integral is decomposed into a sum of five terms. The first term is computed numerically and represents a large fraction of the total resonance integral. The four remaining terms are Monte Carlo corrections to the integral. Since the Monte Carlo correction terms represent only a small contribution to the resonance integral, fewer neutron histories are required to achieve a specific uncertainty than would be the case in an all Monte Carlo program. It is assumed there is no absorption in water and clad. All resonance isotopes are lumped into a single isotope having an averaged mass.
5. Restrictions on the Complexity of the Problem: The maximum number of energy points allowable is 8001; the total number of isotopes is limited to 15. Resonance isotopes are lumped together with an averaged mass.
6. Related and Auxiliary Programs: RESQ0 provides a library tape for RESQ2 problems.
7. Typical Running Time: $2\frac{1}{2}$ min for 10 000 histories.
8. Unusual Features of the Program: RESQ2 is most efficient when the escape probability is close to one and when scattering is weak compared to resonance absorption. Therefore, RESQ2 should be used mainly for the study of resonances in the range from 0.625 to 100 eV, where resonance scattering is not a predominant effect.
9. Status: The program is in production and may be obtained by domestic users from the Argonne Code Center.
10. Machine Requirements: RESQ2 requires 40 000 locations of high-speed memory. One tape unit, for the library tape, is needed, as well as either a tape unit or a disk unit for scratch storage.
11. Operating System or Monitor Under Which Program is Executed: RESQ2 is designed to operate under the SCOPE 2.0 system. The FCHIP, CARDS, INP, and IFM routines described in Ref. 2 are called by the program.
12. Other Programming or Operating Information or Restrictions: To convert this program to another computer or operating system, it would be necessary to rewrite the input routine and the tape-handling routine.
13. *References:*

[1]B. L. ANDERSON et al., "RESQ-2: A Combined Analytic Monte Carlo Calculation of Resonance Absorption Based on Superposition," WAPD-TM-665, Westinghouse Electric Corporation (June 1967).

[2]C. J. PFEIFER, "CDC-6600 FORTRAN Programming - Bettis Environmental Report," WAPD-TM-668, Westinghouse Electric Corporation (January 1967).

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Received June 12, 1967

HOT-2

1. Program Name: HOT-2[1]
2. Computer for Which Program is Designed and Programming Languages Used: CDC-6600 FORTRAN IV and ASCENT.

   Although this program is entirely in FORTRAN IV, certain assembly language routines such as PACK,[a] UNPACK, and GETEQP, etc. are utilized by the program. These ASCENT routines are all part of the Bettis computing environment.
3. Nature of Physical Problem Solved: HOT-2 is a digital computer program to solve two-dimensional plane and axially symmetric steady-state and transient heat-conduction problems with diagonal boundaries and interfaces. Mesh spacing (at most 5000 points) is completely variable. As many as 99 regions are permitted to describe spatial variations in material properties, heat-generation rates, and boundary conditions. The heat generation rate and boundary conditions may vary with time.
4. Method of Solution: A nonuniform mesh is imposed on the region of solution, with mesh intervals chosen so

[a]All routine names mentioned in this abstract except DUMMYO are described by Pfeifer.[2]