NUCLEAR SCIENCE AND ENGINEERING: **32,** 150-151 (1968)

Computer Code Abstracts

STRIP

1. Name of Code: STRIP

2. Computer: Philco 2000/211.
   Language: FORTRAN IV.

3. Nature of Problem Solved: Capture and fission resonance integrals are calculated by a fast method in the resolved resonance range, taking explicit account of overlap and interference between resonances in a mixture of resonance absorbers. The resonance integrals are calculated over arbitrary energy bands. Optionally, the neutron flux as a function of energy in one or two regions may be printed out.

4. Method of Solution: The neutron flux is calculated in two regions as a function of energy by solving two coupled integral slowing down equations, using first-flight collision probabilities based on a flat-flux approximation. To meet design requirements for a rapid and accurate cross-section program with a complete treatment of a large number of resonances, several computational aids have been incorporated, the two most important improvements being the calculation of the slowing down source by a recurrence relation, and the use of non-constant fine-energy group widths, which are automatically calculated taking into account the rate of change of the cross sections and the relatively higher importance of the low-lying resonances with respect to their contribution to the total resonance integral.

   The Doppler-broadened resonance cross sections are calculated using a single-level, Breit-Wigner formula. The capture and fission cross sections may be corrected by a set of tabulated smooth correction terms. The scattering is assumed to be isotropic in the CM system.

5. Restrictions on Complexity of the Problem: Number of regions allowed is one or two. In a two-region problem, the inner region may have the shape of an infinite cylinder, an infinite slab, or a sphere. The flux in the outer region may be computed or forced to be $1/E$. The maximum number of elements, each of which may appear in one or two regions, is ten. Three of these elements may include resonances. Each element may contain any number of isotopes within the limit of a total number of 15 isotopes. The maximum total number of resonances is 500. Permissible number of energy points for smooth cross-section correction is 100, and 100 broad energy groups are allowed.

6. Typical Running Time: To calculate the resonance integral of ThO_2 below 4 keV, including 228 resolved resonances, to an accuracy of 0.1%, the running time is about 3 min. For this particular calculation, 2400 fine-energy groups were utilized.

7. Status: In use. Available from Argonne Code Center, Argonne, Illinois 60439.

8. *References:*

J. HELHOLTZ and D. H. ROY, "STRIP—Resonance Absorption Program Treating Overlap and Interference," TP-332, Babcock & Wilcox Company (September, 1967).

J. HELHOLTZ and D. H. ROY, "Resonance Integral Calculations Treating Overlap and Interference," *Trans. Am. Nucl. Soc.*, **10,** 579 (1967).

J. Helholtz
D. H. Roy

The Babcock & Wilcox Co.
Atomic Energy Division
Lynchburg, Virginia 24505

Received October 24, 1967

RAUMZEIT

1. Name of Code: RAUMZEIT[1]

2. Computer for which Code is Designed: CDC 6600 (64 K memory).
   Programming Language: FORTRAN IV.

3. Nature of Problem Solved: The program solves systems of one-dimensional, time-dependent, multigroup diffusion-type equations using either of two treatments of the time dependence (finite differencing or the time-integrated approach[2]).

4. Method of Solution: The code solves a basic source problem by forward elimination, backwards substitution. In an eigenvalue calculation the program iterates on the fission source. The source in a transient calculation is a function of quantities calculated at previous time steps.

5. Restrictions on Complexity: In its present form the code will handle 6 energy groups (6 coupled diffusion-type equations), 300 mesh points, 40 different material compositions, and 6 delayed-neutron groups.

6. Unusual Features: RAUMZEIT is a modification of the static, one-dimensional code RAUM.[3] All the features of the original program are intact. The diffusion and removal terms are input as square matrices, allowing the code to be used for multi-energy-mode calculations as well as with conventional multigroup problems. A transient calculation is preceded by an eigenvalue calculation which normalizes the fission cross sections to obtain a critical configuration at the beginning of the time-dependent problem. The transient may be induced