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Computer Code Abstracts

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1. Name of Program: ISOCRUNCH.
2. Computer for Which Program is Designed and Others upon Which it is Operable: IBM 7090, CDC 1604-A.
3. Nature of Problem Solved: ISOCRUNCH can be used to compute the amount of each isotope in a reaction and decay chain for any specified neutron flux and time, to sum the contributions of various chains to the same isotope, to graph on an associated electroplotter the yield of an isotope vs time for a given flux and to find the optimum time for maximum yield of an isotope in a chain.
4. Method of Solution: The amount of each isotope in a given reaction and decay chain is computed from the exact analytical solution of the Bateman equations, which describe such processes. The graphical option of this program uses a plotting subroutine written for the Benson-Lehner Model J Electroplotter. Optimization of the time for maximum yield of an isotope is accomplished by a gradient search subroutine.
5. Basic Physics Approximations in the Problem Formulation: This program does not take into account the self-shielding of a target in a reactor or the dependence of reaction cross sections on neutron energy which could be handled by adjusting the input data.
6. Restrictions on the Complexity of the Problems: This program will handle up to 50 isotopes in a chain and sum selected isotopes up to 10 chains.
7. Typical Running Time (IBM-7090): The running time on the computer only can be estimated as about three seconds per isotope times the number of nonzero initial concentrations.
8. Related Program: This program is an extension with modifications on the program CRUNCH (ORNL-2958), which was developed to compute the amount of each isotope in a single reaction or decay chain.
9. Status: Presently in use.
10. Reference:
    [1]Charles W. Friend and J. R. Knight, "ISOCRUNCH—Modifications to the CRUNCH Program for the IBM 7090," USAEC Report ORNL-3689, Oak Ridge National Laboratory.
11. Programming Language Used: This program was written in FORTRAN II language for the IBM 7090, and in FORTRAN 63 language for the CDC 1604-A.
12. Material Available: Program decks and referenced document available from authors.

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1. Name of Program: HOT-1
2. Computer for Which Program is Designed: Philco-2000
   Programming Language: FORTRAN
3. Nature of Problem Solved: HOT-1 is a digital computer program to solve two-dimensional plane and axially symmetric steady-state heat-conduction problems with diagonal boundaries and interfaces. Mesh spacing (at most 5000 points) is completely variable. As many as 99 regions are permitted in order to describe spatial variations in material properties, heat-generation rates, and boundary conditions. Material properties are assumed to be region-wise constant and independent of temperature.
4. Method of Solution: A nonuniform mesh is imposed on the region of solution, with mesh intervals chosen so that all region interfaces pass through and connect mesh points in either a horizontal, vertical, or diagonal manner. The differential equations are approximated by