Computer Code Abstract

MURGATROYD

1. Name of code: MURGATROYD
2. Computer for which code is designed: IBM 7090
   Programming system: FORTRAN II
3. Nature of problem solved: The program carries out a calculation of the time dependence of power, fuel temperature, moderator temperature, pressure rise, and inverse period in a one-region liquid-fuel fixed-moderator reactor, by the use of a fifth-order Runge-Kutta procedure with a fixed time step applied to a one-point model. Up to seven groups of delayed neutron precursors may be considered; an effective yield is calculated for each group to account for the reduction in the delayed neutron precursor density due to fuel flow. A variation of reactivity with time (e.g., due to control rod motion) may be inserted as a series of up to 50 straight line segments; insertion of an initial step reactivity is also possible.
4. Restrictions on the complexity of the problem: This program is designed for the analysis of thermal reactors with prompt neutron lifetimes of the order of 0.1 msec or longer; large amounts of computing time may be required if the prompt lifetime is appreciably shorter, due to the large number of time steps required to insure stability of the Runge-Kutta procedure. In the present form the total number of time steps is limited to 2^{17}, since the number of time steps is used as the index of a do loop.
5. Typical running times: About 12 msec per time step, with five delayed neutron precursors.
6. Availability: Source decks and program listing available.
7. *Reference:* ORNL Technical Memorandum, TM-203, April, 1962.

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