

PACKAGE ID - 001330I036000 AX-TNT

KWIC TITLE - Super_Prompt Crit excursions in Sph Geometry

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LIMITATION CODE -UNL **AUDIENCE CODE** - UNL

COMPLETION DATE - 11/19/1980 **PUBLICATION DATE** - 04/01/1966

DESCRIPTION - AX-TNT solves (a) the coupled hydrodynamic, thermodynamical neutronic equations which describe a spherical, super prompt critical reactor system during an excursion. (b) the coupled equations of motion, and ideal gas equation of state for the detonation of a spherical charge in a gas.

SOURCE CODE INCLUDED? - Yes

MEDIA QUANTITY - Media Directory; Software Abstract; Media Includes Source Code, Output;/ 1 CD Rom

METHOD OF SOLUTION - (a) As in the AX1 code the Sn neutronics system of the code calculates the inverse period and the relative power distribution. The inverse period and power distribution are used for calculating the power level and for assigning the energy added to a given region. During short time intervals hydrodynamic and thermodynamic calculations determine the acceleration, velocity, position, density, pressure, internal energy, kinetic energy and temperature of individual regions or mass points. Code tests send the problem to additional thermodynamic-hydrodynamic calculations or to neutronics calculations as the problem progresses. Several different equations of state and combinations of equations of state are used in the hydrodynamic-thermodynamic section of the code, namely - the linear, Clausius-Clapeyron, and ideal gas equations of state. (b) The neutronics section of the AX-TNT code is entirely bypassed. An ideal gas equation of state is used in conjunction with the Von Neumann and Richtmyer viscous pressure in the hydrodynamics-thermodynamics sections of the code, to trace the blast wave resulting from the detonation of a spherical charge.

COMPUTER - IBM360

OPERATING SYSTEMS - Standard control data COOP monitor

PROGRAMMING LANGUAGES - FORTRAN-IV

SOFTWARE LIMITATIONS - Maximum number of energy groups 7. Maximum number of mass points 320. Maximum number of substances + mixtures

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SOFTWARE LIMITATIONS - (CONT) 8. The effects of delayed neutrons and heat transfer are completely neglected.

SOURCE CODE AVAILABLE (Y/N) - Y

UNIQUE FEATURES - The AX-TNT program is basically the same as the AX1 program with the following modifications (a) a combination of the Clausius-Clapeyron and linear equations of state are used in the reactor. Gas regions enclosing the reactor make use of an ideal gas equation of state. A two-temperature region Clausius-Clapeyron expression is used with the triple point as the dividing point between the low and high temperature expression. Several linear sections are used to approximate the heat capacity. The Sn convergence on the fuel enrichment has been incorporated into the code as well as modifications to take into account Doppler contributions to inverse period and a ramp insertion of reactivity. The AX1 code has been expanded from a maximum of 40 regions to 320 regions to allow investigation of shock waves. New control modifications have been included to reduce the increased machine time resulting from the added regions. Minor modifications in the AX1 hydro-dynamic equations allow the investigation of center hole and implosion problems. (b) Using an ideal gas equation for TNT and argon the formation, reflection, refraction, and decay of primary and secondary shock waves can be studied.

RELATED SOFTWARE - The AX-TNT program is an extension of the AX1 program. equations of state are similar to those considered in the RAC code. Delayed neutron effects can be accounted for by using the AIREK2 code during the beginning of the excursion. H Borde has described a code for examining blast waves from a spherical charge.

HARDWARE REQS - 32k memory

TIME REQUIREMENTS - Varies with accuracy criteria, number of mass points and number of energy groups. A typical problem consisting of 20 reactor mass points, 300 gas mass points, and six energy groups takes about 60 minutes. (b) A typical TNT blast-wave problem consisting of 10 TNT regions and 29 argon regions takes about 30 minutes.

ABSTRACT STATUS - Released tested 3/20/2000.

SUBJECT CLASS CODE - Z

KEYWORDS -
COMPUTER PROGRAM DOCUMENTATION
A CODES
DATA

EDB SUBJECT CATEGORIES -
990200

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SOFTWARE ABSTRACT

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SPONSOR - NEA

PACKAGE TYPE - TESTED