PACKAGE ID - 000320IBMPC00 ICARUS-LLNL

KWIC TITLE - One-Dimensional Heat Conduction

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LIMITATION CODE -COPY **AUDIENCE CODE -** LIM

COMPLETION DATE - 06/01/1986 **PUBLICATION DATE -** 06/01/1986

DESCRIPTION - ICARUS-LLNL was developed to solve one-dimensional planar, cylindrical, or spherical conduction heat transfer problems. The IBM PC version is a family of programs including ICARUSB, an interactive BASIC heat conduction program; ICARUSF, a FORTRAN heat conduction program; PREICAR, a BASIC preprocessor for ICARUSF; and PLOTIC and CPLOTIC, interpretive BASIC and compiler BASIC plot postprocessor programs. Both ICARUSB and ICARUSF account for multiple material regions and complex boundary conditions, such as convection or radiation. In addition, ICARUSF accounts for temperature-dependent material properties and time or temperature-dependent boundary conditions. PREICAR is a user-friendly preprocessor used to generate or modify ICARUSF input data. PLOTIC and CPLOTIC generate plots of the temperature or heat flux profile at specified times, plots of the variation of temperature or heat flux with time at selected nodes, or plots of the solution grid. First developed in 1974 to allow easy modeling of complex one-dimensional systems, its original application was in the nuclear explosive testing program. Since then it has undergone extensive revision and been applied to problems dealing with laser fusion target fabrication, heat loads on underground tests, magnetic fusion switching tube anodes, and nuclear waste isolation canisters.

PACKAGE CONTENTS - Media Directory; Software Abstract; UCRL-92909; UCID-20125;

SOURCE CODE INCLUDED? - Yes

MEDIA QUANTITY - 5 5.25 Diskettes

METHOD OF SOLUTION - Finite difference techniques are used to solve the governing differential equations. The finite difference equations are formulated to allow the user to specify a fully implicit, explicit, or a Crank-Nicolson solution type. The resulting system of equations is solved using a tridiagonal reduction algorithm.

COMPUTER - IBM PC

OPERATING SYSTEMS - DOS

PROGRAMMING LANGUAGES - Microsoft FORTRAN 3.3 and BASIC

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SOFTWARE LIMITATIONS - Maximum of 10 different geometric or material regions. ICARUSB does not permit material properties and boundary conditions to vary with time and temperature. The only non-linearity allowed is from the radiative boundary condition.

SOURCE CODE AVAILABLE (Y/N) - Y

OTHER PROG/OPER SYS INFO - The PREICAR preprocessor is written in BetterBASIC, CPLOTIC in IBM BASIC, and ICARUSB and PLOTIC in interpretive BASIC.

HARDWARE REQS - ICARUSF requires 170K bytes of memory, ICARUSB 64K bytes, PREICAR 175K bytes, PLOTIC 95 bytes, and CPLOTIC 90K bytes.

TIME REQUIREMENTS - Execution time is approximately 0.24 seconds/node-cycle for ICARUSB and 0.02 seconds/node-cycle for ICARUSF using an 8087 math coprocessor.

REFERENCES - S. B. Sutton, ICARUS - A General One-Dimensional Heat Conduction Code, UCID-20125, July 20, 1984; Steven B. Sutton, ICARUS, UCRL-92909, July 1985; ICARUS-LLNL, NESC No. 9683.PC, ICARUS-LLNL IBM PC Version Flexible Disk Cartridge Descriptions, National Energy Software Center Note 87-50, March 27, 1987.

ABSTRACT STATUS - Abstract first distributed November 1985. IBM PC version submitted June 1986.

SUBJECT CLASS CODE - H

KEYWORDS -
COMPUTER PROGRAM DOCUMENTATION
I CODES
THERMAL CONDUCTION
BOUNDARY CONDITIONS
HEAT TRANSFER
PHASE CHANGE MATERIALS
CONVECTION
THERMAL RADIATION
TEMPERATURE DEPENDENCE
FINITE DIFFERENCE METHOD

EDB SUBJECT CATEGORIES -
990200 420400

SPONSOR - DOE/DP

PACKAGE TYPE - SCREENED