PACKAGE ID - 000120GENWS01 HEATING7.3

KWIC TITLE - 1,2, or 3-d Heat Conduction Program

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

COMPLETION DATE - 01/01/1995 **PUBLICATION DATE -** 02/01/1993

DESCRIPTION - HEATING7.2I and HEATING7.3 are the most recent developmant in a series of heat-transfer codes and obsoletes all previous versions. HEATING can solve steady-state and/or transient heat conduction problems in one, two, or three-dimensional Cartesian, cylindrical coordinates or spherical coordinates. A model may include multiple materials, and the thermal conductivity, density, and specific heat of each material may be both time and temperature dependent. The thermal conductivity can be anisotropic. Materials may undergo a change of phase. Thermal properties of materials may be input or may be extracted from a material properties library. Heat-generation rates may be dependent on time, temperature, and position, and boundary temperatures may be time and position dependent. The boundary conditions, which may be surface to environment or surface to surface, may be specified temperatures or any combination of prescribed heat flux, forced convection, natural convection, and radiation. The boundary condition parameters may be time-and/or temperature dependent. General graybody radiation problems may be modeled with user-defined factors for radiant exchange. The mesh spacing may be variable along each axis. HEATING uses a run time memory allocation scheme to avoid having to recompile to match memory requirements for each specific problem. HEATING utilizes free-form input.

PACKAGE CONTENTS - Media Directory; Software Abstract; ORNL/TM-12262; ReadMe Files and Installation Notes;

SOURCE CODE INCLUDED? - Yes

MEDIA QUANTITY - 1 CD ROM

METHOD OF SOLUTION - Three steady-state solution techniques are available: point-sucessive-overrelaxation iterative method with extrapolation, direct solution (for one dimensional or two dimensional problems), and conjugate gradient. Transient problems may be solved using any one of several finite-difference schemes. Crank-Nicolson implicit, Classical Explicit procedure (CEP), or Levy explicit method (which for some circumstances allows a time step greater than the CEP stability criterion.) The solution of the system of equations arising from the implicit techniques is accomplished by point-successive-overrelaxation iteration and includes procedures to estimate the optimum acceleration parameter.

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COMPUTER - WORK STATION

OPERATING SYSTEMS - UNIX

PROGRAMMING LANGUAGES - C

SOFTWARE LIMITATIONS - All surfaces in a model must be parallel to one of the coordinate axes which makes modeling complex geometries difficult. Transient change of phase problems can only be solved with one of the explicit techniques - an implicit change-of-phase capability has not been implemented.

SOURCE CODE AVAILABLE (Y/N) - Y

HARDWARE REQS - Most UNIX workstations or mainframes should be adequate.

TIME REQUIREMENTS - Run time is dependent on many factors including among other things: number of nodes in the model, nonlinearities in the model, desired solution(s), and speed of the computer on which it is run. The small sample problems supplied with the distribution required an average less than 3 cpu seconds each on a Northgate 486/66.

REFERENCES - K.W. Childs, HEATING7.2 User's Manual, ORNL/TM-12262, FEBRUARY 1993.

ABSTRACT STATUS - Released AS-IS 08/12/1998.

SUBJECT CLASS CODE - H

KEYWORDS -
COMPUTER PROGRAM DOCUMENTATION
H CODES
HEAT TRANSFER
TRANSIENTS
STEADY-STATE CONDITIONS
PHASE CHANGE MATERIALS
BOUNDARY CONDITIONS
MESH GENERATION

EDB SUBJECT CATEGORIES -
990200 420400

SPONSOR - DOE/ER

PACKAGE TYPE - AS - IS