

PACKAGE ID - 000325SUN0000 TOPAZ2D*

KWIC TITLE - 2D FEM Heat Transfer & E&M Field Code

AUTHORS - Shapiro, A.B.
Lawrence Livermore National Lab., CA (United States)

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

COMPLETION DATE - 04/19/1990 **PUBLICATION DATE** - 04/19/1990

DESCRIPTION - TOPAZ and TOPAZ2D are two-dimensional implicit finite element computer codes for heat transfer analysis. TOPAZ2D can also be used to solve electrostatic and magnetostatic problems. The programs solve for the steady-state or transient temperature or electrostatic and magnetostatic potential field on two-dimensional planar or axisymmetric geometries. Material properties may be temperature or potential-dependent and either isotropic or orthotropic. A variety of time and temperature-dependent boundary conditions can be specified including temperature, flux, convection, and radiation. By implementing the user subroutine feature, users can model chemical reaction kinetics and allow for any type of functional representation of boundary conditions and internal heat generation. The programs can solve problems of diffuse and specular band radiation in an enclosure coupled with conduction in the material surrounding the enclosure. Additional features include thermal contact resistance across an interface, bulk fluids, phase change, and energy balances.

PACKAGE CONTENTS - Media Directory; Software Abstract; UCRL-ID-104558;

SOURCE CODE INCLUDED? - Yes

MEDIA QUANTITY - 1 5.25 Diskette

COMPUTER - SUN

OPERATING SYSTEMS - UNIX TAR

PROGRAMMING LANGUAGES - FORTRAN 77

SOURCE CODE AVAILABLE (Y/N) - Y

RELATED SOFTWARE - Thermal stresses can be calculated using the solid mechanics code NIKE2D, which reads the temperature state data calculated by the TOPAZ codes. No general mesh generation capability is provided. Rows of evenly spaced nodes and rows of sequential elements may be generated. For complex zoning, the mesh generation code and preprocessor, MAZE, should be used. The ORION interactive postprocessor can be used to produce temperature contour, flux contour, various geometry and temperature-time history plots, and plots of temperature vs. distance along arbitrary cut lines. TOPAZ3D is a three-dimensional implicit finite

PACKAGE ID - 000325SUN0000 TOPAZ2D*

RELATED SOFTWARE - (CONT) element code for heat transfer analysis.

REFERENCES - Arthur B. Shapiro, TOPAZ2D--A Two-Dimensional Finite Element Code for Heat Transfer Analysis, Electrostatic, and Magnetostatic Problems, UCID-20824, July 1986; Arthur B. Shapiro, TOPAZ - A finite element heat conduction code for analyzing 2-D solids, UCID-20045, March 1984\ Jerard Smith, 1-d Slab Solidification TOPAZ2D Comparison to Analytical Solution, UCRL-ID-111966, October 1992.

ABSTRACT STATUS - Abstract first distributed October 1984. SUN version submitted April 19, 1990.

SUBJECT CLASS CODE - HW

KEYWORDS -

COMPUTER PROGRAM DOCUMENTATION
T CODES
HEAT TRANSFER
BOUNDARY CONDITIONS
THERMAL STRESSES
ELECTROSTATICS
MAGNETIC FIELDS
FINITE ELEMENT METHOD
SOLIDS
CHEMICAL REACTION KINETICS
ELECTRIC FIELDS
ELECTROMAGNETIC FIELDS
MAXWELL EQUATIONS

EDB SUBJECT CATEGORIES -

990200 420400 661100

SPONSOR - DOE/DP

PACKAGE TYPE - SCREENED