

PACKAGE ID - 000312SUN0001 TEMPEST/N33.5

KWIC TITLE - Computational Fluid Dynamics Package For
Incompressible, 3D, Time Dependent Pro

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

COMPLETION DATE - 01/13/1993 **PUBLICATION DATE** - 04/01/1991

DESCRIPTION - TEMPESTN33.5 provides numerical solutions to general incompressible flow problems with coupled heat transfer in fluids and solids. Turbulence is created with a k-e model and gas, liquid or solid constituents may be included with the bulk flow. Problems may be modeled in Cartesian or cylindrical coordinates. Limitations include incompressible flow, Boussinesq approximation, and passive constituents. No direct steady state solution is available; steady state is obtained as the limit of a transient.

PACKAGE CONTENTS - Software Abstract; PNWD-1536 Vol. 1 Rev. 1; Media Includes Source Code, Compilation Instructions, Linking Instructions, Sample Problem Input and Output;

SOURCE CODE INCLUDED? - Yes

MEDIA QUANTITY - 2 3.5 Diskettes

METHOD OF SOLUTION - Governing equations for coupled momentum, energy, turbulence and constituent transport are solved using finite volume algorithms. All equations are 3-d and time dependent. Coordinates are Cartesian or cylindrical. Equations include: Navier-Stokes, thermal energy (including parallel gray wall thermal radiation), k-e turbulence model, passive constituents. Solution methods include a semi-implicit pressure solution for the Navier-Stokes equations and implicit continuation for energy, turbulence and constituent equations. Implicit algorithms used are ADI and LSOR.

COMPUTER - SUN

OPERATING SYSTEMS - MACHINE SPECIFIC UNICOS, UNIX, VAX/VMS, IBM

PROGRAMMING LANGUAGES - FORTRAN

SOFTWARE LIMITATIONS - Source is easily redimensioned for problem size (number of grid points). Passive constituents are limited to a total of 9 and up to 50 material types are allowed. Package uses the proprietary UNIRAS graphics and DISSPLA graphics libraries

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SOFTWARE LIMITATIONS - (CONT) which are not included with the package, but are available commercially.

SOURCE CODE AVAILABLE (Y/N) - Y

UNIQUE FEATURES - TEMPESTN33.5 is a versatile software package for engineering applications and concept analyses. In addition to the variety of modeling features, including turbulence, constituent transport and thermal radiation, TEMPESTN33.5 has a full complement of output options and postprocessing software. Output options include: field arrays (velocity, temperature, pressure, continuity, etc.), input file image, processed input data, a variety of optional debugging outputs, restart files, post processing files, screen output for monitoring solution progress. A collection of sample problems and output files are included to verify operation and illustrate code features.

RELATED SOFTWARE - Several post-processing and utility software programs are included with this distribution of the code. POSTER is used to produce line, contour and vector plots. MANPLOT is used with POSTER to produce screen and PostScript output for printing. MANPLOT requires access to the proprietary UNIRAS graphics library which is not included in the package, but is available commercially. An alternative to MANPLOT is DISPLOT; it performs the same function but is used with the proprietary DISSPLA graphics library which is not included in the package, but is available commercially. READER is a file conversion utility and is used for porting between different computer platforms.

OTHER PROG/OPER SYS INFO - TEMPESTN33.5 has been vectorized for use on Cray Research and Convex computers and adapted to the Digital Equipment Corporation and Control Data Corporation computers as well. Versions are also available for Apollo and Macintosh Workstations.

HARDWARE REQS - Problem dependent; 4 Mb RAM minimum, 16 Mb recommended.

TIME REQUIREMENTS - Problem dependent. Typical CPU usage is 0.1 millisecond per time step per computational cell on a CRAY XMP or 0.13 millisecond per time step per computational cell on an IBM 560 workstation.

REFERENCES - D.S. Trent and L.L. Eyler, TEMPEST A Computer Program for Three-Dimensional Time-Dependent Hydrothermal-Analysis, PNWD-1536, Vol. 1, Rev. 1, April 1991.

ABSTRACT STATUS - Abstract first distributed January 1991. TEMPEST/N31 submitted October 1989. TEMPEST/N33.1 submitted June 1991. TEMPEST/N33.5 submitted August 12, 1992.

SUBJECT CLASS CODE - H

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KEYWORDS -

COMPUTER PROGRAM DOCUMENTATION
T CODES
INCOMPRESSIBLE FLOW
TURBULENT FLOW
THREE-DIMENSIONAL CALCULATIONS
NAVIER-STOKES EQUATIONS

EDB SUBJECT CATEGORIES -

990200 420400

SPONSOR - DOE/NE

PACKAGE TYPE - AS - IS