

PACKAGE ID - 000551IPS0200 TMAP4

KWIC TITLE - Tritium Migration Analysis Program Version 4

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

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DESCRIPTION - TMAP4 was developed as a safety analysis code, mainly to analyze tritium retention and loss in fusion reactor structures and systems during normal operational and accident conditions. It incorporates one-dimensional thermal and mass-diffusive transport and trapping calculations through structures and zero dimensional fluid transport between enclosures and across the interface between enclosures and structures. Diffusion structures may be linked together with other structures, and multiple structures may interact with an enclosure. A key feature is the ability to input problem definition parameters as constants, interpolation tables, or FORTRAN equations. The code is specifically intended for use under a DOS operating system on PC type minicomputers, but it has also been run successfully on workstations and mainframe computer systems. Use of the equation-input feature requires access to a FORTRAN-77 compiler, and a linker program is required.

PACKAGE CONTENTS - Media Directory; Software Abstract; EGG-FSP-10315; EGG-FSP-10347; Media Includes Source Code, Executable, Auxiliary Material, Compilation Instructions, Object Module, Sample Problem Input and Output;

SOURCE CODE INCLUDED? - Yes

MEDIA QUANTITY - 1 3.5 Diskette

METHOD OF SOLUTION - A preprocessor converts an input deck into a tridiagonal state variable matrix which is stored and subsequently read into a computational module. Input equations if any are compiled and linked with the compiled computational module into an executable file. Solution uses central-difference, time-implicit discretizations for the diffusion equation for heat transfer and mass diffusion within structures and forward-difference Euler discretizations for flows between enclosures. A separate module extracts plot data from one of the output files.

COMPUTER - IBM PS/2

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OPERATING SYSTEMS - DOS 5.0

PROGRAMMING LANGUAGES - FORTRAN 77

SOFTWARE LIMITATIONS - Will operate within 640K of RAM. Maximum number of diffusion structures is 20 with up to 200 total nodes, up to 10 diffusion species, up to 10 enclosure species, up to 40 enclosures, up to 100 convective flow paths between enclosures, up to 50 chemical reactions, up to 10 look-up tables with an aggregate of 240 data pairs, and up to 50 input equations. FORTRAN compiler and linker are required to use equation input feature.

SOURCE CODE AVAILABLE (Y/N) - Y

UNIQUE FEATURES - The high degree of flexibility in defining structures for diffusion and enclosures for convective transport and the ability to use tables and equations in inputs make TMAP4 appropriate for a wide range of problems. It has been verified and validated to INEL Quality Level A making it suitable for use in formal safety analyses.

RELATED SOFTWARE - An earlier version of this code was installed on the NERSC computer system at Lawrence Livermore National Laboratory as TMAP/MOD1. A text editor is required to generate the input file and normally to review the output. Data generated by the Extract module is suitable for importing to spread sheets or graphic packages. A FORTRAN compiler is needed to make use of the equations feature, and a linker is needed to create the executable file from the preprocessor output and the compiled computational module.

OTHER PROG/OPER SYS INFO - Input file structure is specified in user manual. Input file must have .INP extension, output file will have .OUT extension, and plot data file will have .PLT extension when TMAP4 is used with the TMAP4.BAT script file for execution. If used on other than IBM compatible platform or with other than Lahey FORTRAN 77 compiler, recompile of FORTRAN source code will be needed.

HARDWARE REQS - Fits within 640K of RAM. Size of output file depends on parameters in input file.

TIME REQUIREMENTS - Dependent on input file parameters. Typical problems can run in less than five minutes or require hours on an IBM PC.

REFERENCES - G.R. Longhurst, D.F. Holland, J.L. Jones, and B.J. Merrill, TMAP4 User's Manual, EGG-FSP-10315, June 12, 1992; G.R. Longhurst, S.L. Harms, E.S. Marwil, and B.G. Miller, Verification and Validation of TMAP4, EGG-FSP-10347, July 8, 1992.

ABSTRACT STATUS - Submitted November 1992. ESTSC successfully screened February 1993.

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ABSTRACT STATUS - (CONT)

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EDB SUBJECT CATEGORIES -

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SPONSOR - DOE/ER

PACKAGE TYPE - SCREENED