

**PACKAGE ID** - 001121MLTPL00 FEHM

**KWIC TITLE** - Finite Element Heat & Mass Transfer Code

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

**COMPLETION DATE** - 10/01/1996   **PUBLICATION DATE** - 10/10/1996

**DESCRIPTION** - FEHM is a numerical simulation code for subsurface transport processes. It models 3-D, time-dependent, multiphase, multicomponent, non-isothermal, reactive flow through porous and fractured media. It can accurately represent complex 3-D geologic media and structures and their effects on subsurface flow and transport. Its capabilities include flow of gas, water, and heat; flow of air, water, and heat; multiple chemically reactive and sorbing tracers; finite element/finite volume formulation; coupled stress module; saturated and unsaturated media; and double porosity and double porosity/double permeability capabilities.

**PACKAGE CONTENTS** - Media Directory; Software Abstract; Media Includes Source Code, User's Guide;

**SOURCE CODE INCLUDED?** - Yes

**MEDIA QUANTITY** - 1 CD Rom

**METHOD OF SOLUTION** - FEHM uses a preconditioned conjugate gradient solution of coupled linear equations and a fully implicit, fully coupled Newton Raphson solution of nonlinear equations. It has the capability of simulating transport using either a advection/diffusion solution or a particle tracking method.

**COMPUTER** - MLT-PLTFM

**OPERATING SYSTEMS** - Unix

**PROGRAMMING LANGUAGES** - Fortran 77 (95%), C (5%)

**SOFTWARE LIMITATIONS** - Disk space and machine memory are the only limitations.

**SOURCE CODE AVAILABLE (Y/N)** - Y

**UNIQUE FEATURES** - All of the fracture modeling features are available for transport as well as flow.

**RELATED SOFTWARE** - FEHM uses several auxiliary grid-generating packages. GEOMESH/X3D creates unstructured grids in the format for an FEHM input file. Rectangular Grid Generator creates structured grids in the format for the FEHM input file. There is also an

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**RELATED SOFTWARE - (CONT)** auxiliary graphical user interface called the Browser for pre- and post-processing FEHM.

**OTHER PROG/OPER SYS INFO** - A file extension of .dat are input files. Makefiles for each platform are included. The FEHM User's Manual is in the files FEHMN.UM.doc and the Models and Methods is in the files FEHMN.MMS.doc.

**HARDWARE REQS** - A SUN, IBM Risc 6000, HP, SGI, or a Cray running a UNIX based operating system. The amount of memory and disk space depends on the problem running.

**TIME REQUIREMENTS** - Run time requirements depend highly on problem solving, computer running on, and computer load.

**REFERENCES** - G.A. Zyvoloski, B.A. Robinson, Z.V. Dash, and L.L. Trease, Users Manual for the FEHMN Application, LA-UR-94-3788, 1996; G.A. Zyvoloski, B.A. Robinson, Z.V. Dash, and L.L. Trease, Models and Methods Summary for the FEHMN Application, LA-UR-94-3787, 1996; Z.A. Dash, B.A. Robinson, and G.A. Zyvoloski, V&V Plan and Procedures for the FEHMN Application, LA-UR-2064, 1995; Z.A. Dash, B.A. Robinson, and G.A. zyvoloski, V&V Report for the FEHMN Application, LA-UR-2063, 1995.

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**SUBJECT CLASS CODE** - R

**KEYWORDS** -

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AIR FLOW  
ENVIRONMENTAL TRANSPORT  
FINITE ELEMENT METHOD  
FLUID FLOW  
POROUS MATERIALS  
HEAT TRANSFER  
GEOLOGY  
UNDERGROUND

**EDB SUBJECT CATEGORIES** -  
990200 540120

**SPONSOR** - DOE/DP

**PACKAGE TYPE** - AS - IS