

PACKAGE ID - 000767D0VAX00 SIMSOL

KWIC TITLE - Similarity Solution for Multi-Phase Fluid and
Heat Flow in Radial Geometry

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

COMPLETION DATE - 08/01/1991 **PUBLICATION DATE** - 08/01/1991

DESCRIPTION - SIMSOL calculates transient fluid and heat flow for a
uniform geologic medium containing water (in both liquid and vapor
phases) and air, surrounding a constant-strength linear heat source.

PACKAGE CONTENTS - Media Directory; Software Abstract; LBL-28384;
Pergamon Press 0017-9310/90; Journal of Geophysical Research, Vol.
97, NO B2, Pages 1821-1838; Media Includes Source Code, Compilation
Instructions, Linking Instructions, Sample Problem Input and Output;

SOURCE CODE INCLUDED? - Yes

MEDIA QUANTITY - 1 3.5 Diskette

METHOD OF SOLUTION - SIMSOL simplifies the partial differential
governing equations involving time and a radial spatial coordinate
to ordinary differential equations via a similarity transformation.
The resulting coupled ordinary differential equations form a
two-point boundary problem which is numerically integrated using an
iterative Newton-Raphson scheme.

COMPUTER - DEC VAX

OPERATING SYSTEMS - VMS

PROGRAMMING LANGUAGES - FORTRAN

SOFTWARE LIMITATIONS - SIMSOL is limited to problems with highly
idealized geometry: radial symmetry, uniform material properties
and initial conditions, infinite radial extent, constant-strength
heat source.

SOURCE CODE AVAILABLE (Y/N) - Y

UNIQUE FEATURES - Despite the geometrical limitations described above,
SIMSOL considers the full complexity of coupled multi-phase fluid
and heat flow processes in partially saturated geologic media,
including conductive, convective and latent transport of heat,
temperature and pressure dependent fluid properties, vapor pressure
lowering, pore level phase change effects, and an effective
continuum representation of fractured/porous media.

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RELATED SOFTWARE - A graphics package, such as grafpac, is needed if the interactive graphics option of SIMSOL is selected.

HARDWARE REQS - DEC VAX running VMS, Tektronix terminal emulation for interactive graphics. Program should be easily modifiable for UNIX or DOS environments if interactive graphics are not required.

TIME REQUIREMENTS - Highly dependent on problem.

REFERENCES - C. Doughty, User's Guide for SIMSOL (Version 1.0), LBL-28384, August 1991; C. Doughty and K. Pruess, A Similarity Solution for Two-Phase Fluid and Heat flow Near High-Level Nuclear Waste Packages Emplaced in Porous Media, Pergamon Press 0017-9310/90, August 1989; A Similarity Solution for Two-Phase Water, Air, and Heat Flow Near a Linear Heat Source in a Porous Medium, Journal of Geophysical Research, Vol. 97, NO. B2, Pages 1821-1838, February 10, 1992.

ABSTRACT STATUS - Submitted 12/2/94. Released screened 4/27/95.

SUBJECT CLASS CODE - HR

KEYWORDS -

COMPUTER PROGRAM DOCUMENTATION
S CODES
MULTIPHASE FLOW
HEAT FLOW
POROUS MATERIALS

EDB SUBJECT CATEGORIES -
990200 420400

SPONSOR - DOE/RW

PACKAGE TYPE - SCREENED