

HST3D

Model Uses	HST3D models three-dimensional ground water flow and associated heat and solute transport.	
Major Categories	Hydrology and Water Use; Water Quality	<u>Subject Knowledge Level</u> Intermediate
Minor Categories	Temperature; Transport	<u>Technical Difficulty Level</u> Intermediate
Model Type	Conceptual Model	<u>Geographic in Nature?</u> Semi

Abstract

The Heat- and Solute-Transport Program (HST3D) simulates ground-water flow and associated heat and solute transport in three dimensions. Over the years since the release of Versions 1.0 through 1.4, various additions, modifications, and corrections have been made to the original simulator. Major changes included in Version 2 are (1) a revised data-input file with all spatial information described by coordinate location; (2) a new iterative solver for the matrix equations based on a generalized conjugate-gradient method; (3) an evapotranspiration boundary condition; (4) a division of the simulator output into many files; (5) a new set of output files designed for use by post-processing programs for graphical visualization and for flow totalization; (6) a pre-processor for evaluating dimensioning requirements; and (7) a post-processor for totalizing boundary flow rates and cumulative amounts. The post-processing program for graphical visualization must be supplied by the user.

Version 2 of the simulator has been verified using five test problems selected from the published literature. One involves heat transport, four involve solute transport, and all have variable-density fluids.

Future Developments

Some work may be done to improve connectivity with BCFLOW and the ability to store more and one type of boundary condition per boundary facial area.

Model Limitations

Quantities for only one type of boundary condition per zone of boundary facial area can be summed. At present, BCFLOW cannot maintain separate sums for the same type of boundary condition on two or three faces of the same cell. All quantities of a given boundary-condition type for every boundary face of a given cell are combined to form a net summation. Quantities associated with wells are not recognized in Version 2.5 of the BCFLOW program.

Model Features

- Coordinate based spatial data locations
- Iterative solver for matrix equations
- Evapotranspiration boundary condition
- Output to many files
- Output options for post-processing applications

Required Data Types

Unknown

Model Outputs

Output values are written to a file for post-processing whereby total flow rates and cumulative amounts can be calculated for a set of boundary-face sub areas selected by the user.

Hardware Requirements

None noted

DOS

Supported Platforms

UNIX

Software Requirements

None required, though HEC may be used

Windows

Macintosh

Cost, Licensing and Availability

Free - available from link below.

Source

US Geological Survey

Source URL

http://wwwbrr.cr.usgs.gov/projects/GW_Solute/hst/index.shtml