



SVHEAT^{GE}

1D / 2D / 3D FINITE ELEMENT
FREEZE / THAW MODELING

Calculate Conductive and Convective
Heat Movement in Saturated or
Unsaturated Soils.



SOILVISION[®]
INNOVATIVE GEO-MODELING SOFTWARE

SVHEAT™GE is designed for the calculation of conductive and convective heat movement in frozen or unfrozen soils. It has the ability to handle building foundations, pipelines, or thermosyphons and the input of detailed climate weather station data to calculate the influence of atmospheric conditions. The impact of climatic conditions can be determined through an advanced snow boundary condition.

EASY IMPLEMENTATION OF ADVANCED CLIMATE BOUNDARY CONDITIONS

The SVOFFICE™5/GE release of SVHEAT™ software contains the following specific improvements...

- **NEW High-Performance Graphics Engine:** the new 3D CAD graphics engine provides measurably faster overall operation, with the biggest performance increases in the areas of...
 - creation and manipulation of larger, more complex models
 - quicker rotation and translation of objects
 - high quality / print-ready client visuals
 - improved CAD editing controls and responsiveness.
- **N-factor** of energy-based methods of handling the climatic interface including snow, and rigorous coupling with water-flow and air-flow packages. The calculation of ground surface temperature is triggered based on an input air temperature.
- **Plot frozen/thawed depth versus time of temperature profiles**
- **Implemented Imperial parameters to determine performance of thermosyphons**
- **Initial conditions of 2D/3D can be imported from a 1D .dat file**
- **NEW SVDESIGNER™ Conceptual Modeling Software Package:** This brand new software program is tightly integrated with SVOFFICE™5/GE and allows for the

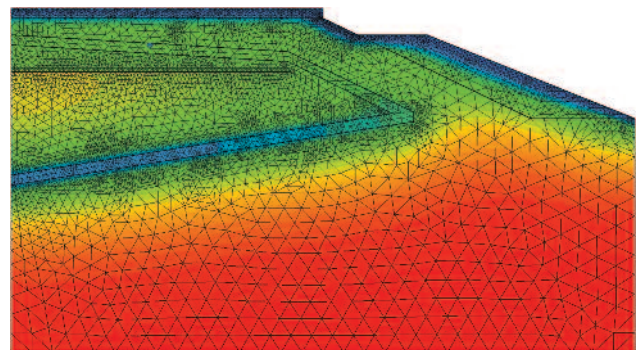
representation and manipulation of complex 3D geometry and takes 3D modeling to a whole new level.

- **Improved Charting:** High quality, exportable charts.
- **Re-organized Menu:** the menu system within the software has been reorganized to be more clear. Primary functions are organized in a left to right format along the menu.
- **New SVOFFICE™5/GE Manager:** the project manager dialog has been redesigned to greatly simplify its usage. Models can easily be grouped by project and stored anywhere on the user's disk drive.

The SVHEAT™GE software package continues to be a market-leading thermal analysis package which offers both 2D and 3D analysis. It is applicable to geotechnical, civil, and mining-related engineering projects.

The product can be coupled with SVFLUX™GE and/or SVAIR™GE to model complex situations.

SVHEAT™GE is designed for the calculation of conductive and convective heat movement in saturated or unsaturated soils. The software implements the ability to handle thermosyphons and the input of detailed climate weather stations data to calculate the influence of atmospheric conditions. Advanced boundary conditions allow the accommodation of the thermally insulating effects of snow. Geothermal gradients and the movement of freezing fronts are easily calculated and visualized. SVHEAT™GE allows you to analyze steady-state or



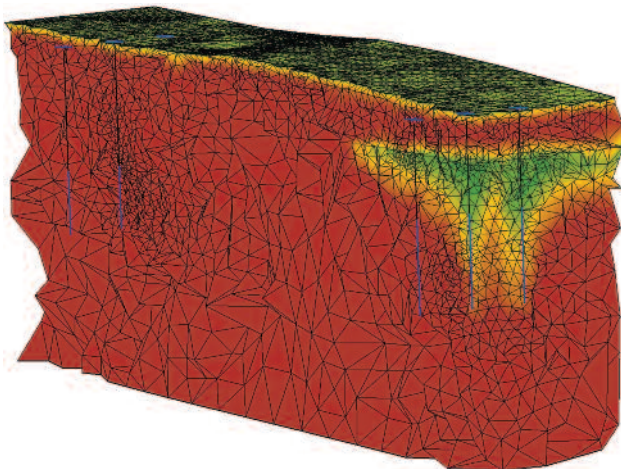
Hairpin thermosyphon

transient thermal conduction and convection models. Convection models may be created by coupling with SVFLUX™GE. User defined soil properties define the latent heat released or absorbed during the ice-water phase change.

SVHEAT™GE is currently being used by universities and consultants around the world. Feel free to contact us for more information.

Key features and capabilities of SVHEAT™GE:

- **Easy to Use:** Featuring a familiar user interface with easy to understand icons and functions. The software tools behave exactly how you would expect with a short learning curve. You will be able to start modeling right away.
- **Fully-integrated 1D / 2D / 3D geotechnical suite:** 1D, 2D, Plan, Axisymmetric and 3D solutions handle any type of modeling problem.
- **Fully automatic mesh generation and mesh refinement.**
- **Model both conductive and convective heat flux,** in frozen or unfrozen conditions.
- **Snow** - modeling of the insulating effects of snow is possible with advanced boundary conditions.
- **Climatic interface:** SVFLUX™ / SVHEAT™ allows entry of detailed climatic data to calculate surface temperatures.
- **Full coupling** with SVFLUX™ and SVAIR™



3D borehole warm water injection.

- **Simple and powerful user interface** allows rapid creation of effective models.
- **Easily generate 3D models** from 2D cross-sections, or slice 3D models into 2D cross-sections.
- **Extensive QAQC program**

Common Applications:

The following list is a collection of the most common applications for SVHEAT™. Most of these are included as downloadable sample models from the cloud.

- Perform climatic analysis in the unsaturated/vadose zone.
- Model the depth of freezing during winter months
- Model the application of thermosyphons to freeze the ground
- Ground freezing for soil stabilization, including the use of freezing pipes around mine shafts or thermosyphons on top of earth dams
- Simulate the process in borehole thermal energy storage systems (BTES), which includes simulating the heat injection into the boreholes, the heat that can be stored and then extracted from the BTES, and the potential thermal losses in the ground
- Model heat flow in underground foundations
- Freeze-thaw action beneath airport runways
- Model geothermal reservoirs: locating re-injection wells, production forecasting, volume calculation, heat resource estimation
- Perform general geothermal modeling of canals
- Model mine stopes and other underground mine structures by coupling SVHEAT™ with SVFLUX™. Calculate the ice/water interface and track frozen zones in the subsurface
- Perform climatic analysis of earth covers by coupling SVHEAT™ with SVFLUX™
- Degradation of permafrost beneath warm buildings or around a warm, buried pipeline
- Frost depth penetration beneath chilled structures such as a recreational ice surface or a highway during winter
- Model the thermal regime around ponds, roadways
- Development of a frost bulb around a chilled pipeline
- Effectiveness of various insulation alternatives for reducing freezing and / or thawing



THE MOST VERSATILE SUITE OF MULTI-DIMENSIONAL GEOTECHNICAL AND HYDROGEOLOGICAL ANALYSIS TOOLS WE HAVE EVER DEVELOPED.

WE HAVE REDEFINED THE "NEW" STANDARD... AGAIN.

EXCITING NEW FEATURES!

SVOFFICE™5 introduces new features, speed, precision and functionality that have not been available in any other geotechnical analysis software until now.

SVOFFICE™5 boasts a completely new Manager with "Learning" and "Expert" user modes to get you up and running even faster; a completely reimagined and modern Soil Properties database application; a new user friendly 3D model geometry builder and visualizer... SVDESIGNER™; improved user interface for a more intuitive streamlined workflow; an entirely new graphics subsystem to handle more complex geometry, speed up workflows and allow for high resolution output of visuals.

What we haven't changed is our commitment to keep developing leading-edge software at a breakneck pace, exceptional technical support and user training.



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