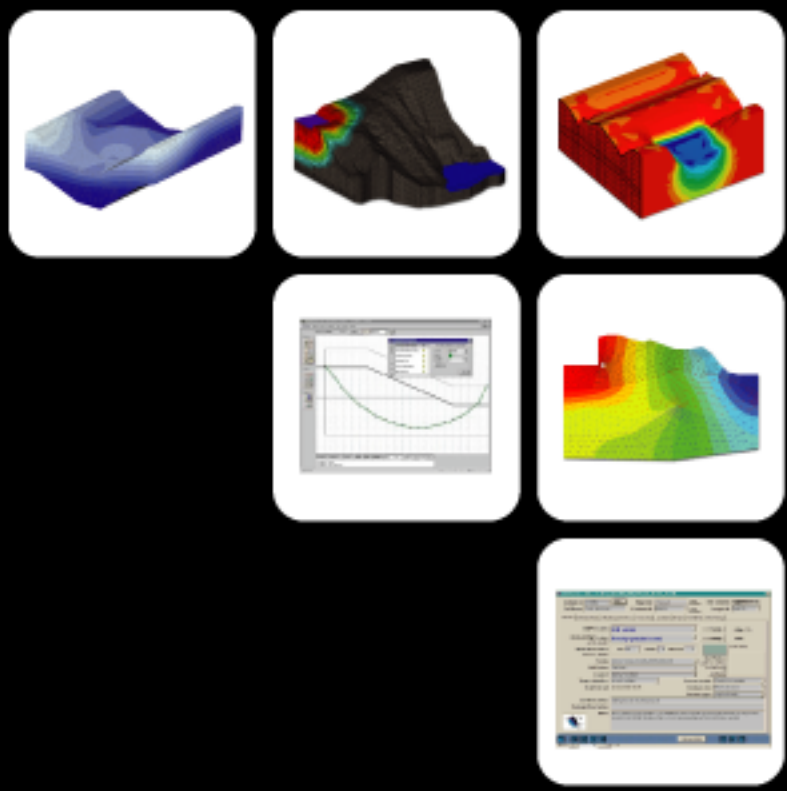
SoilVision Office

Fast. Simple. Powerful.



Software for engineering professionals that is fast, simple and powerful. SoilVision software is designed from the ground up to make complex model creation much easier than most conventional software packages on the market.

Our products provide data management, model creation, solution and visualization for a wide variety of problems. Whether you are doing groundwater modeling or stress deformation calculations, our software provides you with advanced finite element solutions to complete the job. Automatic mesh generation and refinement makes solutions available with greatly reduced effort.

SoilVision Office is the premiere option for engineering professionals looking for high quality subsurface modeling software.

Products

SoilVision 3.0 - Soil Database Software
SVFlux 2D / 3D - Seepage Modeling
ChemFlux 2D / 3D - Contaminant Transport Modeling
SVHeat 2D / 3D - Heat Transfer Modeling
SVSolid 2D / 3D - Stress Deformation Modeling
SVDynamic - Slope Stability Analysis

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Software Features

SVFlux 2D / 3D

Simulation Features
- ▶Steady-state or transient (time-dependant) analysis.
- ▶Saturated or unsaturated analysis.
- ▶Flux sections may be placed on internal or external irregular surfaces and/or extruded walls of the problem. Water flow with time may be tracked across flux sections.
- ▶Anisotropic analysis at any angle (version 3.0). 3D anisotropy is defined by two angles.
- ▶Add contaminant transport analysis with our ChemFlux software.

Model Design Features
- ▶Head or flux boundary conditions may be specified as contants or free-form equations. Free form equations may be specified as a function of position or time (i.e., h=30+exp(t)*2.5)
- ▶Tables of net flux data may be cut and pasted into SVFlux to act as boundary conditions. This feature allows modeling of flux boundaries where weather station data is available. The z component of vertical flux boundaries may be isolated to simulate precipitation on steep irregular surfaces.
- ▶Import soil-water characteristic curve or permeability data from the SoilVision software. The SoilVision database contains laboratory data on over 6000 soil-water characteristic curves, over 2500 ksat values, and over 400 unsaturated permeability curves.
- ▶Initial water table for a transient analysis may be entered as a surface or imported as heads from a steady-state analysis.

Applications
- ▶Unconfined flow.
- ▶Infiltration / precipitation.
- ▶Design of earth covers.
- ▶Pond infiltration.
- ▶Excess pore-water pressure build-up and dissipation.
- ▶Seepage modeling involving geomembranes.
- ▶Water and contaminant movement (with ChemFlux) in mine tailings and leach pads.
- ▶Time-dependant water flow.
- ▶Water (and contaminant) flow in the unsaturated (vadose) zone.
- ▶Aquifer recharge.
- ▶Dam seepage.

System Requirements (All Packages)
Finite Element 2D/3D packages run on Windows 95/98, NT 4.0, Me, 2000, and XP. The recommended minimum hardware configuration is a P266 with 128MB RAM and 35 MB hard disk space.

ChemFlux 2D / 3D

Simulation Features
- ▶Transient (time dependant) analysis.
- ▶Saturated or unsaturated analysis.
- ▶Model advection, diffusion, adsorption, and radioactive or biological decay.
- ▶Import groundwater gradients from SVFlux.
- ▶Flux sections may be placed on internal or external irregular surfaces and/or extruded walls of the problem.
- ▶Contaminant flow with time may be tracked across flux sections.
- ▶Fully automatic mesh generation and refinement. Mesh refinement is based on the relative error of the governing equation and therefore automatically locates critical zones. In a transient analysis a different mesh is generated for each time step. Mesh refinement allows reduction in numerical dispersion and artificial oscillation numerical problems typically encountered in contaminant transport models. ChemFlux is currently the only groundwater package in the world to offer mesh refinement.
- ▶Mesh refinement can be set to follow the contaminant front whereby greatly increasing solution stability and accuracy.
- ▶Fully automatic time-step refinement for transient analysis. The time-steps selected by the solver are independant of the plotting intervals selected by the user.

Model Design Features
- ▶Import geometry from SVFlux.
- ▶Concentration or flux boundary conditions may be specified as contants or free-form equations. Free form equations may be specified as a function of position or time (i.e. C=0.8+exp(t)*0.3).

Applications
- ▶Single-phase miscible contaminant movement.
- ▶Movement of contaminants out of tailings pits and earth containment facilities.
- ▶Solution of advection-dominated problems typically plagued by convergence problems.
- ▶Modeling of problems dominated by radioactive or biological decay.
- ▶Model contaminant movement through any combination of advection, dispersion, adsorption and/or decay.

SVHeat 2D / 3D

Simulation Features
- ▶Steady-state analysis.
- ▶Transient (time dependant) analysis.
- ▶Saturated or unsaturated analysis.
- ▶Flux sections may be placed on internal or external irregular surfaces and/or extruded walls of the problem.
- ▶Energy with time may be tracked across flux sections.
- ▶Fully automatic time-step refinement for transient analysis. The time-steps selected by the solver are independant of the plotting intervals selected by the user.
- ▶SVHeat is designed to model the transition between frozen and unfrozen soils. Functional properties such as thermal conductivity versus temperature and unfrozen water content versus temperature may be entered to describe the phase change relationship between ice and water. Specific heat may be specified to follow the constant or Newman formulation.

Model Design Features
- ▶Head or flux boundary conditions may be specified as contants or free-form equations. Free form equations may be specified as a function of position or time (i.e., T=30+exp(time)*2.5+0.5*y).
- ▶Initial water contents may be imported from a SVFlux analysis.

Applications
- ▶Thermal design of roads and airstrips.
- ▶Ground freezing for soil stabilization.
- ▶Insulation design for shallow buried piping.
- ▶Thawing beneath heated or chilled structures.
- ▶Freezing around chilled pipelines.
- ▶Temperature variation over large areas with significant relief.

SVDynamic 2D

Simulation Features

SVDynamic represents a revolutionary new method of slope stability analysis that extends the capabilities of limit equilibrium methods of analysis.

Slope stability analysis is an integral part of many geotechnical engineering studies. Although numberous methods of analysis exist, the failure mechanism is still not fully understood.

Force and moment equilibrium methods can be applied to the stability problem and will provide a computed factor of safety. All limit equilibrium methods rely on a critical assumption regarding the shape of the slip surface. The normal force on the base of the slice is determined by applying statistical equilibrium to a slice from the sliding mass. The location of the critical slip surface is determined by trial and error.

SVDynamic makes use of a finite element stress analysis (SVSolid) to compute the stress state in a soil mass. Various soil models can be used for the computation of the stress states. SVDynamic makes use of dynamic programming to calculate the most probable location of the slip surface. No assumption needs to be made regarding the shape of the slip surface since the determination of the shape is part of the solution. Non-circular slip surfaces may be computed from irregular soil layering.

The SVDynamic solution provides a global factor of safety as well as the distribution of the local factors of safety along the critical slip surface.

SVSolid 2D / 3D

Simulation Features
- ▶Five different soil models including linear elastic, Duncan and Chang, as well as a nonlinear model.
- ▶Soil models may vary by region. For example, a soil using a linear elastic model may be adjacent to a soil using the Duncan and Chang model.
- ▶Unsaturated deformations of soils may be modeled.
- ▶Initial conditions may be imported from a previous analysis. The OCR of a previous analysis may be specified to determine the initial preconsolidation pressure of the current analysis. Any variable from a previous analysis may be specified as an initial condition for the next analysis.
- ▶Anisotropic analysis at any angle in 2D or 3D.
- ▶Axisymmetric analysis.
- ▶Use of Skempton's A and B parameters to compute pore-water pressure build-up.

Model Design Features
- ▶Free, fixed, displacement constant or expression, force contant or expression, or water boundary conditions may be specified. Free form equations may be specified as a function of position (i.e. d=0.5+log(x)*0.1).
- ▶Initial water table may be graphically drawn on the problem or imported from an SVFlux analysis.

Applications
- ▶Foundation design.
- ▶Regional subsidence due to pumping of aquifers.
- ▶Design of slab foundations subjected to unsaturated shrinking or swelling.
- ▶Embankment or excavation construction.
- ▶Small-strain consolidation analysis when coupled with SVFlux.
- ▶Excess pore-water pressures caused by the placement of fill.
- ▶Modeling of problems with complex geometry.

Common Features

The following features are common to all our finite element packages:

Simulation Features
- ▶Fully automatic mesh generation. Mesh generation may be limited by a maximum number of nodes or by a maximum specified error.
- ▶Fully automatic mesh refinement. Mesh refinement is based on the relative error of the governing equation and therefore automatically locates critical zones. In a transient analysis a different mesh is generated for each time step. Our packages are currently the only packages in the world to offer this feature applied to geotechnical engineering.
- ▶Finite element analysis by the Galerkin method. The solver uses advanced features such as preconditioning of the convergence matrix as well as staging and automatic mesh refinement to achieve solutions with greater stability than any other software currently available.
- ▶Fully automatic time-step refinement for transient analysis. The time-steps selected by the solver are independant of the plotting intervals selected by the user.

Model Design Features
- ▶CAD style view entry of geometry and other modeling objects.
- ▶3D models built as stacked surfaces. Each surface may be imported from Surfer or any XYZ data text file.
- ▶Each surface may have multiple regions defined.
- ▶Surface grids are independant of region geometry and may be irregular or overlap.
- ▶Import AutoCAD .dxf geometry and incorporate it directly in the model. The automatic mesh generation will automatically allign node points with line segment end points.
- ▶Graphical model design may be exported as a WMF or DXF file and/or printed.
- ▶Bitmap or DXF geometry may be imported and layered behind model geometry to simplify model creation (version 3.0).

Output Features without TecPlot Module
- ▶Color 2D contour plots of all solution variables may be produced at any X, Y, or Z plane section through the problem.
- ▶Plots may be zoomed to isolate any region of interest.
- ▶2D Vector plots of any component variable may be produced at any X, Y, or Z plane section through the problem.
- ▶Volume or mass integrals may be computed over the entire problem or any particular region of interest.
- ▶Mesh plots track general mesh refinement.
- ▶Plots of value versus time may be generated at any coordinate for any solution variable.
- ▶Graphical output may be exported to BMP or PNG formats.

Output Features with TecPlot Module
- ▶Color visualization of 3D mesh is available.
- ▶Transparency allows visualization of internal mesh and/or isosurfaces.
- ▶Cutaways allow user to view internal sections of the model.
- ▶Color 3D contour plots of any solution variable may be placed on any face of the model. Custom color shadings may be specified.
- ▶Isosurfaces may be plotted.
- ▶Overlaying of plots may be performed. For example, vectors may be shown in Region 1 while contours of head may be shown in Region 2.
- ▶3D Vector plots of gradients.
- ▶Text and line art may be added to output.
- ▶Graphical output may be exported to WMF, DXF, JPG, or BMP formats.
- ▶Plotting of 3D streamtraces.
- ▶Animation of 2D or 3D transient results.
- ▶Overlay of DXF files.

SoilVision Database

Description
SoilVision is the premiere product worldwide for the estimation of unsaturated soil properties. The knowledge-based component can provide input for analysis of unsaturated soils. SoilVision provides over 20 journal published algorithms for the estimation of soil properties required for unsaturated seepage modeling. A soils database including laboratory data on over 6000 soils is also included. SoilVision can assist the modeler in estimating suitable input for the modeling of unsaturated soil processes independent of extensive laboratory testing programs.

Key Features
- ▶Over 20 journal published estimation methods - estimate unsaturated soil properties for seepage modeling.
- ▶Mathematical fitting of soil functions.
- ▶Professional reporting.

Advantages over other solutions
- ▶Theoretical estimation of soil properties
- ▶Pre-existing laboratory database of over 6000 soils
- ▶Geostatistics module allows quick statistical analysis of your laboratory data
- ▶Only commercial database application in the world capable of managing unsaturated soils information.
- ▶Management of geoenvironmental data.
- ▶Automatic soil texture classification by the USDA or USCS (ASTM) methods.
- ▶Mathematical fits of soil property functions allows soils in certain "bands" to be selected.
- ▶Mathematical model provides input for finite element and finite difference models.