



Soilvision Systems Ltd. Announces The Release Of SV Flux - Saturated/Unsaturated Automated 2D/3D Finite Element Seepage Modeling

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The real world is three-dimensional. Therefore, if a seepage software package is to let users model a wide range of problems, it must offer 3-D capabilities. In addition, users demand quick, easy-to-obtain answers to seepage problems. The release of SV Flux, takes an enormous leap in functionality over currently available software to reach this goal. These users can create and analyze models in 2D or full 3-D without extensive laboratory testing programs or the need to worry about building a finite element mesh. The model's solution is dependent upon the accuracy of the soil properties provided. SV Flux bundled with SoilVision provides a sophisticated database system for managing your soils information as well as access to an unsaturated soil laboratory database on over 6000 soils.

Fully automatic mesh generation, mesh refinement, and time-step refinement (for transient problems) allows the soil professional to focus on the big picture. Conventional seepage software requires the user to spend hours creating a finite element mesh without knowledge of the location of critical zones. Convergence problems would then disallow a reasonable solution to the problem because elements in the critical zones were too large. Furthermore, refinement of the mesh must be performed manually and are not only difficult but the user is given no indication as to the location where the mesh needs to be refined.

The SV Flux solver alleviates user concern with the convergence of the solution. SV Flux allows the user to specify the exact accuracy level required by the output. If the user desires his output to be accurate to within 1 cm of water head, that is simply specified to the SV Flux software. The solver will then automatically refine the mesh in critical zones until the desired accuracy level is achieved.

2D Model Creation

Creation of the seepage model becomes a relatively simple process since the user is not required to describe the mesh. 2D problems are simply described as regions, boundary conditions, and soil properties. Care was taken in the design of the CAD interface to allow user's to describe geometry in a manner similar to the world standard AutoCAD™ software. Grids and several snapping methods allow geometry to be specified in a quick and accurate fashion. Model geometry may be output on .WMF, .EMF, or .DXF formats.

Boundary conditions may be specified as either head or flux conditions. In addition, free-form equations may be specified based on time or head to describe boundary conditions.

An accurate description of soil properties is required for accurate model results. SV Flux provides the user with a small database of unsaturated seepage soil properties to draw from. For the uncompromising user, the SoilVision knowledge-based database software system may be coupled with SV Flux to provide the user with access to unsaturated experimental data on over 6000 soils. If you only have a grain-size distribution for your soil, SoilVision will allow you to estimate your seepage soil properties using any of 20 published estimation methods. Variance of soil properties may be significant for unsaturated soils. To account for this, SoilVision allows groups of soils to be pulled from the database and plotted. The user may then focus on reasonable variance of the seepage model based on varying soil properties.

3D Model Creation

Creation of a 3D seepage model is designed to replicate the manner in which geological strata was laid down; as surfaces and layers. "We have noticed consultants making increased use of digitized survey data in describing the topology of their problems. Our desire with SV Flux was to allow consultants to make use of this digitized data to describe non-uniform and complex topological features." comments Murray Fredlund, SoilVision System's President. Once surfaces are input, they may be combined to form layers with separate boundary conditions possible for the sides and surfaces of each layer.



An additional model creation feature allows placement of a topological drawing behind the drawing grid of the CAD workspace. This allows the user a top-down view of the geometry of the ground-level surface in which elevations may be accurately mapped onto the surface layer. AutoCAD™ style functionality also allows the visibility of surfaces to be turned on or off according to how the user wants to visualize the model.

In addition to the many features implemented into model creation, SV Flux makes use of database functionality to record your models. The database functionality allows your consulting firm to build your own library of seepage models and soil properties. As the size of the model database grows, so does your efficiency as new models may be created by copying geometry and soil properties from previously described models. Problems are also tagged with GIS descriptors to allow viewing of the location of your seepage model with ArcView.

Visualization

Visualization of your problem results may be accomplished in two ways. The standard software allows contour and vector plots of pressure and head on any region (2D) or on any slice through a 3D problem. 3D visualization of the generated grid is also possible. Flux sections through 2D problems may be accomplished simply and efficiently. All plots may be printed or output to .WMF or .EMF formats.

Sophisticated high-power visualization of 2D and 3D results may be accomplished using our TecPlot™ add-on. TecPlot™ allows extreme control over coloring options and additional plotting features such as pathlines, cut-aways, transparency, isosurfaces, and animations.

System requirements

SV Flux runs under Windows 95/98, NT 4.0, Me, and 2000. The recommended hardware configuration is 128M bytes of RAM, 30 M bytes hard disk space and 16-bit color graphics.

About the company

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SoilVision Systems Ltd. has its headquarters in Saskatoon, Canada. The privately held firm was initially founded in 1997 by Murray Fredlund, Ph.D. as a software developer specializing in knowledge-based database products. Their pioneer product was a knowledge-based database system entitled SoilVision which was used for the estimation of unsaturated soil properties. In 1999 the company released version 2.0 of their popular SoilVision database software which was geared as a data warehouse for consulting engineers. Most recently the company introduced SV Flux, a soil seepage finite element tool for the graphical modeling of complex seepage problems in two or three dimensions.