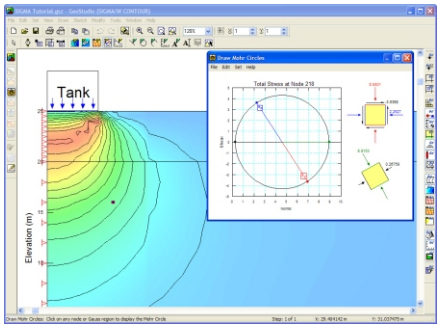
SIGMA/W© 2007

Stress-deformation analysis.



Typical Applications

SIGMA/W can model almost any stress/deformation problem including:

- Settlement of footings, fluid-filled tanks, or earth structures
- Deformation within or underneath an embankment or earth dam
- Closure around a tunnel
- Lateral movement of braced or anchored excavations and surface settlement around the excavation
- Floor rebound of open-pit, sloping excavations
- Volume changes (uncoupled consolidation or heave) resulting from pore-water pressure changes
- Staged fill placement, earth removal
- Soil-structure interaction, including free un-bonded anchors, cross excavation struts, and trusses
- Fully-coupled consolidation analysis
- Simulation of tailings deposition
- Permanent deformations resulting from strength loss
- Strength reduction stability
- plus many more!

Comprehensive and Powerful

SIGMA/W is a finite element software product that can be used to perform stress and deformation analyses of earth structures. Its comprehensive formulation makes it possible to analyze both simple and highly complex problems. For example, you can perform a simple linear elastic deformation analysis or a highly sophisticated, nonlinear elastic-plastic effective stress analysis.

The many constitutive soil models allow you to represent a wide range of soils or structural materials. In addition, when coupled with SEEP/W, SIGMA/W can model the pore-water pressure generation and dissipation in a soil structure in response to external loads.

These features enable SIGMA/W to analyze almost any stress or deformation problem you will encounter in geotechnical, civil, and mining engineering projects.

Easy to Use

Defining a Stress and Deformation Problem
The unique CAD-like technology in SIGMA/W allows you to generate your finite element mesh by drawing regions on the screen. You can then specify material properties and interactively apply boundary conditions, structural elements, trusses, and fill or excavation layers. If you make a mistake, you can correct it using the Undo command.

Viewing the Results
Once you have solved your problem, SIGMA/W offers many tools for viewing results. View a deformed mesh or displacement vectors at any magnification. Generate contours or x-y plots of more than 30 computed parameters, including deformation, total and effective stress, strain and pore-water pressure. Display shaded yield zones. View the stress state at any node or element Gauss point as a Mohr Circle with the associated space-force diagrams. Plot shear or moment distribution along structural elements. Then export the results into other applications, such as Microsoft Excel or Word, for further analysis or to prepare presentations.

Integrated with Other Applications

Use SIGMA/W stresses in SLOPE/W or QUAKE/W
Using finite element computed stresses in SLOPE/W makes it possible to conduct a rigorous stability analysis using the same stress values resulting from the deformation analysis. In addition, you can use SIGMA/W stresses as the initial stress state for a dynamic earthquake analysis in QUAKE/W.

Use SIGMA/W pore-water pressures in SLOPE/W or SEEP/W
Excess pore-water pressures generated by static loading, such as fill placement, can be brought into SEEP/W to study how long it takes to dissipate the excess pressures in the foundation. You can use SLOPE/W to analyze the effect of these excess pressures on stability during construction, allowing you to determine the need for staged loading.

GeoStudio™
One Model. One Tool. Many Analyses.

Requirements

- Pentium III with Microsoft Windows 2000, XP, or Vista (recommended: Intel dual-core processor with 1GB of RAM)
- 800x600 display (recommended: 1024x768 or higher)
- CD-ROM drive (for installation)
- USB Port

GeoStudio™

One Model. One Tool. Many Analyses.

SIGMA/W 2007 is part of GeoStudio, an integrated tool containing GEO-SLOPE's leading suite of geotechnical modeling software products: SLOPE/W, SEEP/W, SIGMA/W, QUAKE/W, TEMP/W, CTRAN/W, AIR/W and VADOSE/W. Using GeoStudio means you can run all of these products in one environment, creating one model definition that is shared among all products.

For example, when you create your geometry and material properties in one product, they are available immediately in all other products. Your model is stored in one definition file, which is based on the industry-standard XML format. Sharing the data lets you run many analyses on the same problem. You can use the results from one analysis in another, or import files created by previous versions of the software.

Features

- Analysis types include drained total and effective stress, undrained total and effective stress, 2D plane strain, 3D axisymmetric, consolidation and swelling, and insitu stress
- Constitutive soil models include linear-elastic, anisotropic linear-elastic, nonlinear-elastic, elastic-plastic, and Modified Cam-clay
- Boundary condition types include X and Y displacements, forces, pressures, and spring constants, as well as self-weight gravity loading
- Structural beam and bar elements for soil-structure interaction
- Staged loading for fill placement or earth removal
- Un-coupled volume change due to pore-pressure changes
- Fully-coupled stress-pore pressure analyses
- User Add-In constitutive models
- Undo and redo commands
- plus many more!

Formulation

SIGMA/W is formulated for 2-dimensional plane strain or axisymmetric problems using a small displacement, small strain, incremental load formulation. For each load step, incremental displacement at each node resulting from the incremental load is computed and added to the displacement at the beginning of the load step to give the total displacement. For soil models with nonlinear material properties, SIGMA/W solves the equations iteratively using the Newton-Raphson technique; soil properties are updated every iteration until a converged solution is achieved.

You can simulate the filling and excavation of materials by activating or deactivating finite elements at various stages of the construction process. SIGMA/W can be used with SEEP/W for un-coupled consolidation analyses. SEEP/W calculates transient pore-water pressure changes due to the applied load, while SIGMA/W calculates deformations resulting from the pore-water pressure changes.

Join a growing network

By acquiring GEO-SLOPE software, you are joining a group located in more than 100 countries, including practising engineers, university professors, regulators, researchers and students. You can be assured that we will support and continue to enhance the software's engineering capabilities, making it even more powerful and easy to use.

Get help when you need it

When you need assistance with your model, we have helpful services available. Attend one of our workshops, or communicate directly with our experienced numerical modelling professionals. We'll help you to create better models and to gain confidence in your results.

Try out SIGMA/W now!

We invite you to try out SIGMA/W for yourself! Simply call (403) 269-2002 or visit www.geo-slope.com to receive a free CD-ROM.

GEO-SLOPE INTERNATIONAL

1400, 633 - 6th Avenue S.W.
Calgary, Alberta, Canada T2P 2Y5
Tel: (403) 269 2002
Fax: (403) 266 4851
E-mail: info@geo-slope.com
Web: http://www.geo-slope.com