

Geomechanics Module

User's Guide

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The Geomechanics Module

The Geomechanics Module is an optional package that extends the Structural Mechanics Module to quantitative investigations of geotechnical processes. It is designed for researchers, engineers, developers, teachers, and students, and suits both single-physics and interdisciplinary studies within geomechanics and soil mechanics.

The module includes an extensive set of material models, including:

- Material models for soil mechanics, such as the Drucker–Prager and Mohr–Coulomb yield criteria, the Modified Cam-Clay model, and the Hardening Soil model.
- User-defined plasticity, flow rule, and hardening models.
- Perfect plasticity models for concrete, like Bresler–Pister and Ottosen.
- Coupled damage–plasticity models for concrete.
- Brittle damage models.
- Rock models, like Hoek–Brown.
- Creep models.
- Predefined and user-defined nonlinear elastic materials: Ramberg–Osgood, Hardin–Drnevich, Duncan–Chang, and others.
- Hyperelastic materials: Saint-Venant–Kirchhoff and Neo-Hookean.

These material models can also couple to any new equations created, and to physics interfaces (for example, heat transfer, fluid flow, and solute transport in porous media) already built into COMSOL Multiphysics and its other specialized modules.

ACCESSING THE GEOMECHANICS MODULE DOCUMENTATION

Because this is an add-on module requiring the Structural Mechanics Module, the feature information, including theory and modeling details, is included in the *Structural Mechanics Module User's Guide*.

When you install COMSOL Multiphysics, the documentation sets are installed in several locations, both on your computer and most easily accessible while you are working in COMSOL Multiphysics. The next section details where to access it.

ACCESSING COMSOL DOCUMENTATION AND APPLICATION LIBRARIES

A number of online resources have more information about COMSOL, including licensing and technical information. The electronic documentation, topic-based (or context-based) help, and the Application Libraries are all accessed through the COMSOL Desktop.




If you are reading the documentation as a PDF file on your computer, the [blue links](#) do not work to open an application or content referenced in a different guide. However, if you are using the Help system in COMSOL Multiphysics, these links work to open other modules, application examples, and documentation sets.

THE DOCUMENTATION AND ONLINE HELP



The *COMSOL Multiphysics Reference Manual* describes the core physics interfaces and functionality included with the COMSOL Multiphysics license. This book also has instructions on how to use COMSOL Multiphysics and how to access the electronic Documentation and Help content.


Opening Topic-Based Help

The Help window is useful as it is connected to the features in the COMSOL Desktop. To learn more about a node in the Model Builder, or a window on the Desktop, click to highlight a node or window, then press F1 to open the Help window, which then displays information about that feature (or click a node in the Model Builder followed by the **Help** button (). This is called *topic-based* (or *context*) *help*.


Win

To open the **Help** window:

- In the **Model Builder**, **Application Builder**, or **Physics Builder**, click a node or window and then press F1.
- On any toolbar (for example, **Home**, **Definitions**, or **Geometry**), hover the mouse over a button (for example, **Add Physics** or **Build All**) and then press F1.
- From the **File** menu, click **Help** ().
- In the upper-right corner of the COMSOL Desktop, click the **Help** () button.

Mac	<p>To open the Help window:</p> <ul style="list-style-type: none"> • In the Model Builder or Physics Builder, click a node or window and then press F1.
Linux	<ul style="list-style-type: none"> • In the main toolbar, click the Help () button. • From the main menu, select Help > Help.

Opening the Documentation Window

Mac	<p>To open the Documentation window:</p> <ul style="list-style-type: none"> • Press Ctrl+F1.
Linux	<ul style="list-style-type: none"> • In the main toolbar, click the Documentation () button. • From the main menu, select Help > Documentation.

THE APPLICATION LIBRARIES WINDOW

Each model or application includes documentation with the theoretical background and step-by-step instructions to create a model or application. The models and applications are available in COMSOL Multiphysics as MPH files that you can open for further investigation. You can use the step-by-step instructions and the actual models as templates for your own modeling. In most models, SI units are used to describe the relevant properties, parameters, and dimensions, but other unit systems are available.

Once the Application Libraries window is opened, you can search by name or browse under a module folder name. Click to view a summary of the model or application and its properties, including options to open it or its associated PDF document.

Opening the Application Libraries Window

To open the **Application Libraries** window ():

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