

Spring 2014: Computational and Variational Methods for Inverse Problems COMSOL Multiphysics info sheet

We will use COMSOL Multiphysics v3.5a in combination with MATLAB in class and for the next few assignments. COMSOL helps with the discretization of partial differential equations and allows us to use variational/weak forms. We use an older version of COMSOL as its syntax (and the way it connects to MATLAB) changed with version 4.0. When you start COMSOL with MATLAB, it will look like MATLAB but have additional functionality. You can find a reference guide for the additional functions provided by COMSOL at http://users.ices.utexas.edu/~georgst/teaching/Comsol_reference_guide.pdf, or you can use the help function. Besides being able to run with MATLAB, COMSOL also provides its own graphical user interface (GUI), which you can get by starting COMSOL without MATLAB or by typing `comsol` in the MATLAB interface. This graphical interface, which is particularly popular amongst engineers, is useful for solving PDEs, but it is hard to use for inverse problems.

Access: All registered students can get access to the resources of the department of geological sciences, which has an appropriate installation of COMSOL Multiphysics with MATLAB. Log into <https://geodb.geo.utexas.edu>¹ to activate your account using your UTID user name and password. After waiting a few minutes, you can either work directly in the computer room of the department or connect via ssh to `seismic1.geo.utexas.edu`. You can also use the machines `seismic2`, `seismic3`, `seismic4`, `seismic5`. Your username is your UTID with corresponding UTID password, e.g., I would use

```
ssh gs8239@seismic1.geo.utexas.edu -X.
```

Start COMSOL by typing

```
comsol35a matlab
```

in any Linux shell.

To test if everything works, simply try to run one of the following test examples we used in class, which you can find from the class website (http://users.ices.utexas.edu/~omar/inverse_probs/index.html) under assignment 3. One example solves the Laplace equation (specified in weak form), which is linear. Another example solves a nonlinear minimal surface problem.

¹This site is only available from campus.