1.383 TUNNELLINER MANUAL

1 - Install MATLAB

Tunnelliner is a program written for the MATLAB computational environment, so you need to run MATLAB in order to use Tunnelliner. Anyone with a Kerberos ID can use MATLAB on Athena computers on campus. In addition, MIT students can install a free version of MATLAB on their personal computers. To do that, go to http://matlab.mit.edu and follow the instructions to download and install MATLAB. You must be connected to the MIT network whenever you run the software, because your free license comes from a pool of licenses shared among students over the network.

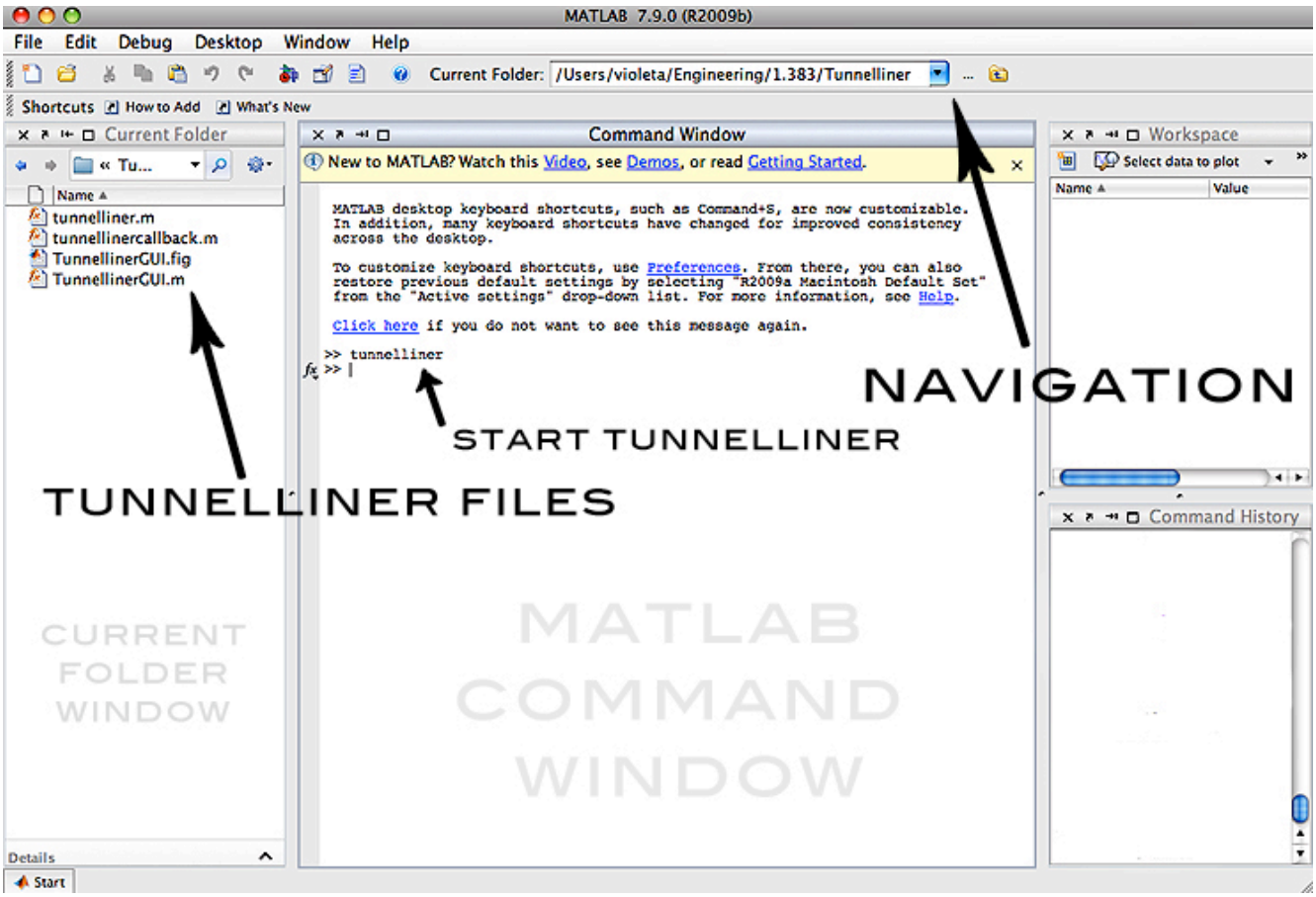
2 – Download Tunnelliner

The files of the Tunnelliner program, along with a PDF copy of this manual, can be downloaded from: http://web.mit.edu/acmath/tunnelliner. Save all files in the same folder on your computer in order for the program to run properly; e.g., create a folder called *Tunnelliner* and save all files there.

3 - Start Tunnelliner

Refer to the figure below and follow these steps to start Tunnelliner within MATLAB:

a) Start MATLAB on your computer or on Athena as you would start any other application.
b) Navigate to the folder where you saved the program's files (the *Tunnelliner* folder) using the folder navigation options in the MATLAB graphical user interface (GUI). Once there, you will see the Tunnelliner files listed in the *Current Folder* panel (see figure).
c) In the *Command Window* panel of the MATLAB GUI, type **tunnelliner** (see figure).
d) The Tunnelliner program will start. Follow instructions in Step 4 for how to use it.



4 – Input Parameters

Once you start Tunnelliner within MATLAB, you will use the program's user interface (see figure below) to enter input parameters and compute stresses around the liner.

Ground and Liner Parameters

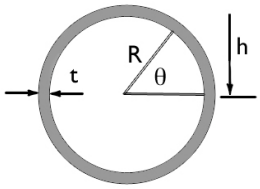
You can change the following input parameters for the ground and the support by typing their values:

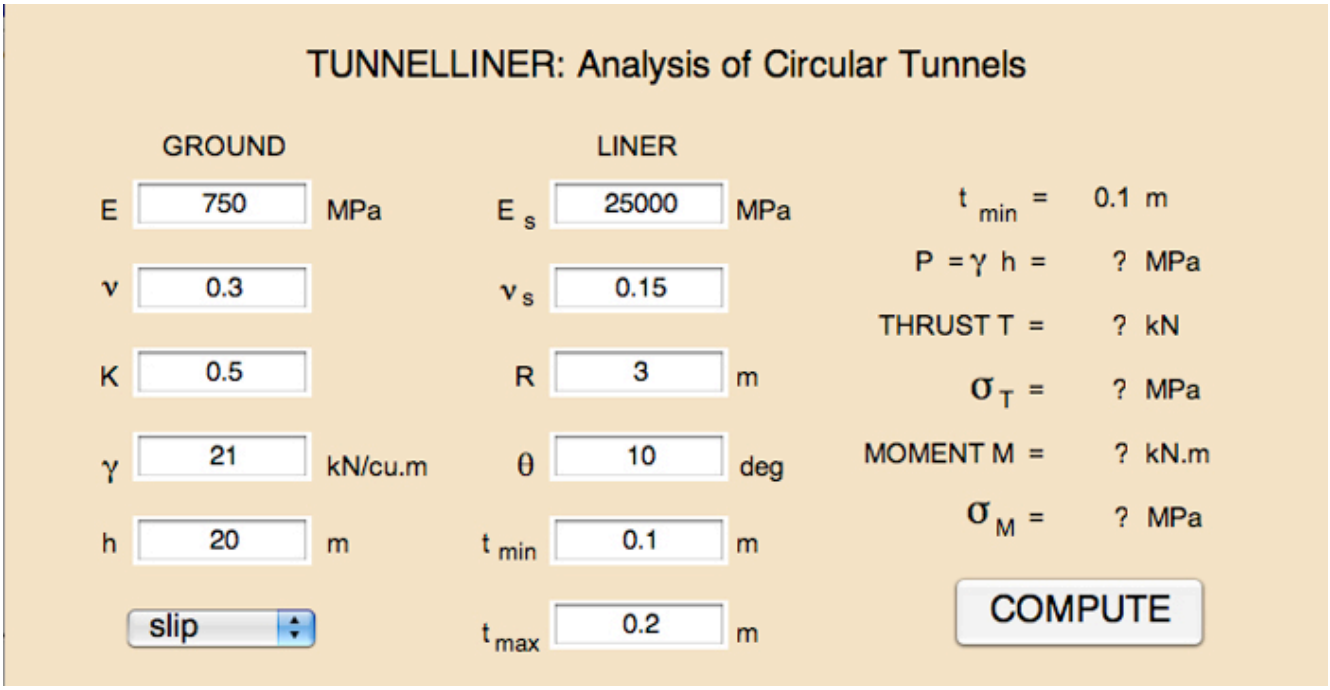
Ground

E	Elastic modulus of ground
ν	Poisson's ratio of ground
K	Lateral earth stress coefficient
γ	Unit weight of ground
h	Depth of tunnel (see inset)

Liner

E_s	Elastic modulus of support
ν_s	Poisson's ratio of support
R	Radius of tunnel's cross section
θ	Angle from the horizontal (see inset)
t	Liner thickness range from t_{min} to t_{max}





Boundary Conditions at Ground Liner Interface

Use the popup menu to select **slip** (i.e., full-slip) or **no-slip** boundary conditions.

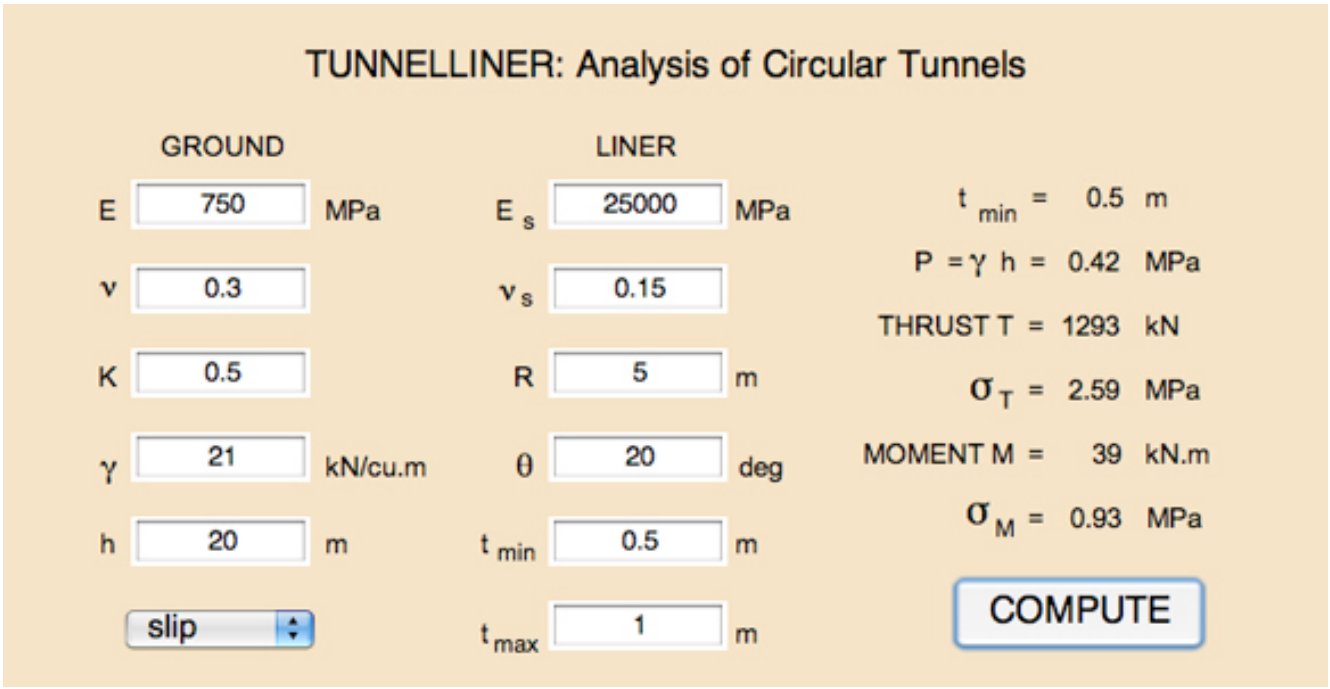
Thrust, Moment, and Stresses

After selecting the input parameters, press the COMPUTE button to compute the following results:

P	Ground stress	T	Thrust	σ_T	Stress due to T
		M	Moment	σ_M	Stress due to M

5 – Review Results

After you press the COMPUTE button, Tunnelliner will display in the right hand side of its GUI the results for P, T, M, σ_T, and σ_M from the computations where $t=t_{min}$ (see figure on next page).



In addition, Tunnelliner will create two plots (see figure below), which you can print and save:

a) σ_T and σ_M *v.* t, where t varies from t_{min} to t_{max}

b) σ_T and σ_M *v.* θ for t = t_{min}, where θ varies from 0 to 2π