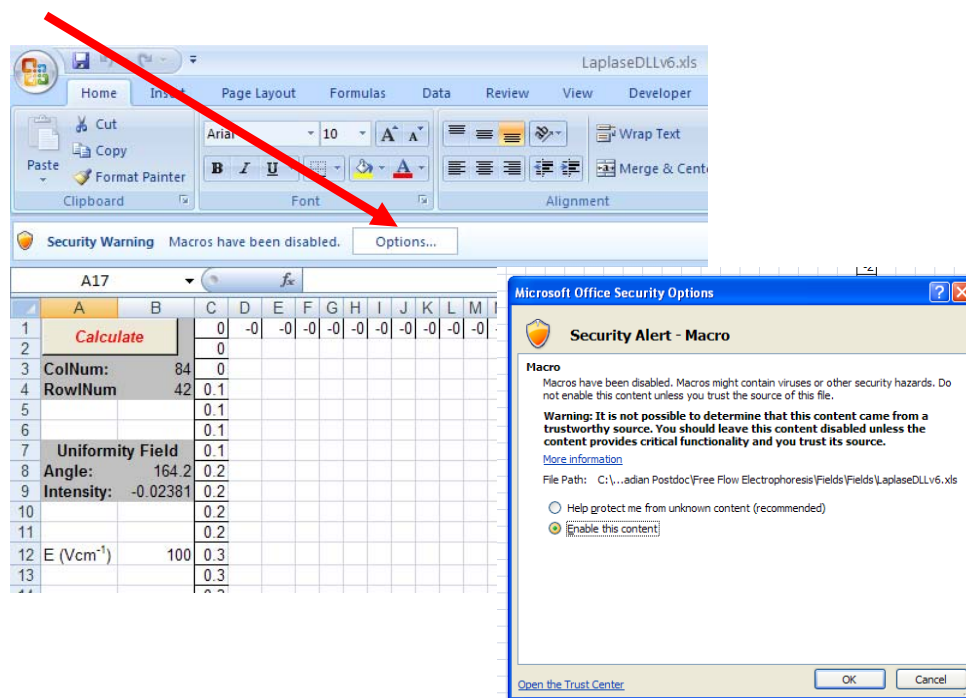


## Using Laplace.dll

1. Download the “Laplace.dll.xls” and “FieldStructure.dll” files from the research section of the site: <http://www.chem.yorku.ca/profs/krylov/>
2. It is imperative to keep the excel file “Laplace.dll.xls” and the Pascal file “FieldStructure.dll” in the same folder.
3. Open the file “Laplace.dll.xls” There are three worksheets available. Click on the worksheet named “Input”. If a security warning appears that macros have been disabled, click on the Options tab and select “Enable this content”.



4. The shape for the separation channel is rectangular.
  - 4.1. To alter the aspect ratio of the separation channel, set the number of columns to the desired width of the channel in mm and the number of rows to the length of the channel in mm. e.g. For a channel that is 3 cm wide and 5 cm long, set the number of columns to 30 (Cell B3) and the number of rows to 50 (Cell B4). The speed of the program decreases as the area of the separation channel is increased.
  - 4.2. Then click on an empty cell before clicking on the “Redraw Borders” button.
  - 4.3. Set the value of the desired angle in Cell B8
  - 4.4. Set the value of the electric field strength in Cell B12
  - 4.5. Click in a blank cell and then click the button marked “Apply”

- 4.6. Finally click the button marked "Calculate"
5. Click on the worksheet marked output. A brightly colored graphic should appear showing equipotentials (locations that share the same voltages). The equipotentials should be straight and parallel to each other. Note the direction of the field is from high potential to low potential in a direction perpendicular to the equipotentials (from red to blue).
  - 5.1. Users wishing to view the voltage at each grid point can click on individual grid points in the output worksheet as required.
6. Click on the worksheet marked trace.
  - 6.1. If you altered the aspect ratio of the rectangle, you will need to click the "Calculate" and "Redraw" buttons. (The purpose of the redraw is to make the graphic the same shape as the separation channel.)
  - 6.2. Two traces should be visible.
7. There are several user inputs marked by grey boxes.
  - 7.1. "dt" specifies the time increment. If the traces do not reach the maximum y-value, this value should be increased.
  - 7.2. " $v_{hd}$ " specifies the hydrodynamic velocity in  $\text{cm s}^{-1}$ .
  - 7.3. "No. of steps" specifies how many calculations are involved in generating the traces. It affects how quickly the traces are generated.
  - 7.4. "Max x" and "Max y" are reminders of the aspect ratio that you chose for the separation channel and cannot be altered without going back to the initial worksheet.
  - 7.5. "Init x" and "Init y" refer to the position of the input of the sample stream
  - 7.6. " $\mu_{ep}$ " refers to the electrophoretic mobilities of the species to be separated (**in the absence of electroosmotic flow**).