

# Bill Knowlton

## Depts. of MSE & ECE

## Boise State University

This program uses the Manipulate[] command that manipulates a function to fit imported data.

- Fitting Data using the Manipulate Command

In[296]:=

```
Clear[importdata5, listplot5]
(*data set of imported data - import command not shown*)
importdata5 = {{0.00334`, 4.58788`*^-6},
  {0.00346`, 4.16952`*^-6}, {0.00358`, 3.79579`*^-6},
  {0.00372`, 3.35778`*^-6}, {0.00386`, 2.98317`*^-6},
  {0.00401`, 2.67922`*^-6}, {0.00418`, 2.44083`*^-6},
  {0.00436`, 2.12836`*^-6}, {0.00456`, 1.91711`*^-6},
  {0.00478`, 1.7267`*^-6}, {0.00502`, 1.54076`*^-6},
  {0.00528`, 1.34978`*^-6}, {0.00557`, 1.19435`*^-6},
  {0.0059`, 1.03894`*^-6}, {0.00627`, 9.09009`*^-7},
  {0.00669`, 7.79369`*^-7}, {0.00717`, 6.61049`*^-7},
  {0.00772`, 5.66451`*^-7}, {0.00837`, 4.82351`*^-7},
  {0.00913`, 3.96025`*^-7}, {0.01004`, 3.32133`*^-7},
  {0.01116`, 2.76539`*^-7}, {0.01255`, 2.35178`*^-7},
  {0.01434`, 2.02712`*^-7}, {0.01672`, 1.80342`*^-7},
  {0.02005`, 1.60884`*^-7}, {0.02504`, 1.4826`*^-7},
  {0.03338`, 1.36252`*^-7}, {0.04999`, 1.30728`*^-7},
  {0.09844`, 1.92484`*^-7}, {0.17689`, 1.95479`*^-7}}

(*List plot of the data*)listplot5 = ListLogLogPlot[importdata5,
  PlotRange -> {8*10^-8, 3*10^-6}, Frame -> True, GridLines -> Automatic,
  PlotStyle -> {RGBColor[0, 0, 1], AbsolutePointSize[8],
  FrameLabel -> {" $\frac{1}{T}$  (K-1)", "| J (A) |"}]}
```

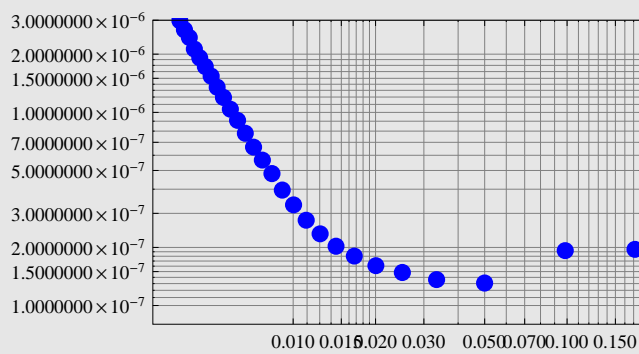
Out[297]=

```

{{0.00334, 4.58788×10-6}, {0.00346, 4.16952×10-6},
 {0.00358, 3.79579×10-6}, {0.00372, 3.35778×10-6},
 {0.00386, 2.98317×10-6}, {0.00401, 2.67922×10-6}, {0.00418, 2.44083×10-6},
 {0.00436, 2.12836×10-6}, {0.00456, 1.91711×10-6}, {0.00478, 1.7267×10-6},
 {0.00502, 1.54076×10-6}, {0.00528, 1.34978×10-6}, {0.00557, 1.19435×10-6},
 {0.0059, 1.03894×10-6}, {0.00627, 9.09009×10-7}, {0.00669, 7.79369×10-7},
 {0.00717, 6.61049×10-7}, {0.00772, 5.66451×10-7}, {0.00837, 4.82351×10-7},
 {0.00913, 3.96025×10-7}, {0.01004, 3.32133×10-7}, {0.01116, 2.76539×10-7},
 {0.01255, 2.35178×10-7}, {0.01434, 2.02712×10-7}, {0.01672, 1.80342×10-7},
 {0.02005, 1.60884×10-7}, {0.02504, 1.4826×10-7}, {0.03338, 1.36252×10-7},
 {0.04999, 1.30728×10-7}, {0.09844, 1.92484×10-7}, {0.17689, 1.95479×10-7}}

```

Out[298]=



- Commands used below are: Manipulate[ ]; Show[ ]; LogLogPlot[ ];

1. Manipulate[ ] command: allows one to manipulate an equation based on its variables.
2. Show[ ] command: allows multiple plots to be shown on one plot. In this case, it is used to show a List plot and a Log-Log plot and is used within the Manipulate[ ] command to show data and the equation to fit the data.
3. LogLog[ ] command: used to show a Log-Log plot. I could have used a LogPlot[ ] command or just a Plot[ ] command.

```
(*Manipulate command and an embedded Show command to show
both the equation and imported data on the same plot*)
Manipulate[Show[
  (*Show will display the plots*)
  LogLogPlot[Jo + A1 * x * Exp[-x / t1] + A2 * x^(2 * n) * Exp[-(x / t2)] ^n,
    {x, .0008, .18}, PlotRange -> {1 * 10^-7, 1.5 * 10^-5}, Frame -> True,
    GridLines -> Automatic, PlotStyle -> {Thick, RGBColor[0, 0, 1]},
    FrameLabel -> {" $\frac{1}{T}$  (K-1)", "| J (A) |"}],
  listplot5],
  {{Jo, 130 * 10^-9, Style["Jo ( $\frac{A}{cm^2}$ )", Medium]}},
  {130 * 10^-10, 130 * 10^-8, Appearance -> "Labeled"},
  {{A1, 0.04, Style["A1", Medium]}, .001, .1,
  Appearance -> "Labeled"}, {t1, 0.00095, Style["t1", Medium]},
  1 * 10^-4, 1 * 10^-2, Appearance -> "Labeled"},
  {{A2, 22 * 10^-6, Style["A2", Medium]}, 1 * 10^-6,
  1 * 10^-4, Appearance -> "Labeled"},
  {{n, .25, Style["n", Medium]}, .125, 1, Appearance -> "Labeled"},
  {{t2, 0.001, Style["t2", Medium]},
  1 * 10^-4, 1 * 10^-2, Appearance -> "Labeled"}]
```

Jo ( $\frac{A}{\text{cm}^2}$ )

A1

t1

A2

n

t2

Out[299]=

