
OVERVIEW

This laboratory involves using file input to incorporating data into Mathematica and then then fitting the data with expressions.

TASKS

Incorporating, Analyzing, and Plotting Data from a File.

In the file located at <http://pruffle.mit.edu/3.016-2006/Laboratories/NELSON.DAT> you will find data 128 observations of the voltage at which an insulator material failed (i.e., dielectric breakdown, short, big sparks and “zzzzt”). The file has three columns in it.

Col. 1 The voltage (in kilovolts) at which the insulator failed.

Col. 2 The number of weeks the insulator material was aged at some elevated temperature.

Col. 3 The temperature (in degrees Celsius) at which the material was aged.

The objective is to read this data into Mathematica and plot the averages and other information about the data.

1. Plot all the data as points in a single three dimensional plot, using *temperature*, *time*, and *dielectric breakdown voltage* as the *x*, *y*, and *z* axes.
2. Find a linear fit to the data, and show the data with the linear fit.
3. Find a quadratic fit to the data, and show the data with the quadratic fit.
4. Find the non-linear fitting parameters to

$$V = \exp(\alpha - \beta e^{-QT}t)$$

where V is dielectric breakdown voltage, T is temperature in Kelvin, and t is time. Illustrate your fit.

Save your Work Save your work as a mathematica notebook: 3016_Lastname_Lab05.nb.

REPORT

This homework will be graded. Your report on the work above should be ordered as it is above. Your report should include comments that would help one of your classmates understand what your work demonstrates. Send your report as a saved Mathematica notebook with name 3016_Lastname_Lab05.nb to 3016-labreports@pruffle.mit.edu. As the subject use “3.016 Lab 05 LASTNAME”.