Procedure for calculating k

1. Program settings on instrumentation, i.e.- amplitude of current, sample rate, and resolution of DC voltage measurements.
2. Trigger measurements and current on at the same time.
3. Pause until all measurements are finished. Get them to matlab. Stop current and close instruments.
4. Now I have a matrix V with all the DC voltage measurements that occurred during joule heating. Construct a matrix t where t is the same length as V, with each element corresponding to time elapsed since onset of measurements. This information comes from inverting the sample rate so that it is expressed in seconds, or time between measurements. t = ([1:length(V)]).\*dt
5. Construct a matrix R\_wire\_meas according to ohm’s law, where R\_wire\_meas = V/ampl; Ampl is the amplitude of the DC current. This was set in the matlab code and sent to the instrument before heating.
6. Take the first element of the R\_wire\_meas matrix to be the nominal resistance of the wire. R\_meas\_1 = R\_wire\_meas(1);
7. q = ((ampl^2)\*(R\_meas\_1))./L, where q is heat generation per unit length of the wire
8. Construct a matrix Delta\_R, where each element of R\_wire\_meas has had nominal resistance subtracted out. Delta\_R = R\_wire\_meas-R\_meas\_1;
9. To convert change in R to change in T, use expression for thermoresistance. Delta\_T = ((R\_wire\_meas/R\_meas\_1)-1)./beta;
10. Fit a first-order (line) to log(t), Delta\_T. P=polyfit(log(t),Delta\_T,1);
11. Expression from Nagasaka and Nagashima for k=((q)/(4\*pi))/ [d(deltaT)/d(ln(t))]., where P(1) is the element in the fit matrix corresponding to the slope of the line, d(deltaT)/d(ln(t)).
12. Temperature of wire based on Resistance: Rk = (R\_meas\_1-15.36)/(beta\*15.36)+296
13. In degrees Celsius: Rc = (R\_meas\_1-15.36)/(beta\*15.36)+296-273