**Problem:** The Stefan-Boltzmann law can be employed to estimate the rate of radiation of energy H from a surface, as in

(1)

Where H is in watts, A = the surface area (m2), e = the emissivity that characterizes the emitting properties of the surface (dimensionless), σ = a universal constant called the Stefan-Boltzmann constant ( = 5.67 x 10-8 W m-2K-4), and T = absolute temperature (K). Determine the error of H for a copper sphere with radius 0.15 +/- 0.01 m, e = 0.90 +/- 0.05, and T 550 +/- 20. Repeat the computation but with T = 650 +/- 40.

**Solution:** I used Matlab script files to write the code and output the answers.

Here are my answers:

***H at 550° = 1320 +/- 441, and H at 650°=2576 +/- 633***

Here is my code:

%% Problem 5(book4.9)

clear all; close all; clc

%e = emissivity, t = absolute temp, sigma = Boltzman constant,

e = 0.90;

eerror = .05;

t = 550;

terror = 20;

r = 0.15;

rerror = .01;

a = 4\*pi\*r^2;

aerror = abs(8\*pi\*r)\*rerror;

sigma = 5.67e-8;

H = a\*e\*sigma\*t^4;

et = abs(e\*sigma\*t^4)\*aerror + abs(a\*sigma\*t^4)\*eerror + abs(a\*e\*sigma\*4\*t^3)\*terror;

t2 = 650;

t2error = 40;

H2 = a\*e\*sigma\*t2^4;

et2 = abs(e\*sigma\*t^4)\*aerror + abs(a\*sigma\*t^4)\*eerror + abs(a\*e\*sigma\*4\*t^3)\*t2error;

fprintf('H at 550° = %0.0f+/-%0.0f, and H at 650°=%0.0f+/-%0.0f\n',H,et,H2,et2);