AME 60636
Homework 2
Due: Friday, 3 February 2012, in class

Consider a problem of hydrogen dissociation and recombination:

$$H_2 + M \rightleftharpoons H + H + M.$$

1. Consider the appropriate parameters for the reaction as found in the 2005 *AIAA Journal* paper found in the documents section of the course home page. Take $T = 6000\ K$. Find thermodynamic properties from any standard thermodynamics textbook. Write a code in `Fortran` and `Mathematica` to calculate the concentrations as a function of time if initial concentrations are $\widehat{\overline{\rho}}_{H_2} = 10^{-6}\ mol/cm^3$, $\widehat{\overline{\rho}}_{H} = 10^{-6}\ mol/cm^3$. Give plots of concentration versus time and pressure versus time.

2. For the same initial conditions, generate a plot of how the equilibrium concentrations of H and H_2 vary with temperature.

3. Give a plot of how the time scales found by linearization near equilibrium behave as temperature is varied over a wide range.