DEPARTMENT OF AEROSPACE ENGINEERING

Indian Institute of Technology Kanpur

Rocket Propulsion (Code: AE441A)

Instructor: Sathesh Mariappan

Assignment due: 13 September 2021

Course assignment: Adiabatic flame temperature Maximum Marks: 10

1. Calculation of adiabatic flame temperature for various equivalence ratio

   - Write a computer program (in Matlab, Fortran, C etc.) to obtain adiabatic flame temperature for a given fuel, equivalence ratio and initial temperature of the mixture.
   - Choose a fuel for your problem.
   - From the tables, for your fuel obtain all the heat of formation values.
   - Assume c_p is constant and use the value at 1200 K.
   - For the initial temperature of $T_i = 298$ K, obtain and plot the variation of adiabatic flame temperature (T_{ad}) with equivalence ratio Φ.
   - Repeat this exercise for other initial temperatures $T_i = 500,\ 700$ K.
   - Plot all the three graphs.
   - Now relax the assumption of constant c_p. Make it a function of temperature $c_p(T)$ and use the empirical relation given in the table.
   - Find the adiabatic flame temperature and compare your results with the case of constant c_p. How much error is incurred?
   - Write your observation and make a report.

[10]

Student's name: End of exam