Run all 3 programs with the Solve(F2) button. No parametric tables were used in any of the programs. Here is a brief overview of every program.

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

Part 1 - a:

Code relating to the complete combustion assumption of the first segment of the preliminary design. (Problem 1)

Important variables:

m\_dot\_1 Primary air mass flowrate

m\_dot\_2 Secondary air mass flowrate

m\_dot\_3 Dilution air mass flowrate

a[i] The mole count of O2 in our reactants PER 1 MOLE OF FUEL

Note that for every variable that is in a array (such as this one), I have split the problem into 3 different runs:

Every variable with a [1] subscript is the value of that variable at the end of ER1

Every variable with a [2] subscript is the value of that variable at the end of ER2, as if ER1 and ER2 were both taken as a single control volume

Every variable with a [3] subscript is the value of that variable at the end of ER3, as if ER1, ER2 and ER3 were both taken as a single control volume

b[i],c[i],d[i],e[i],f[i],g[i],j[i],k[i],m[i],n[i] Mole count of the different product species PER 1 MOLE OF FUEL

n\_tot[i] Total mole count of our product species PER 1 MOLE OF FUEL

y\_()[i] Mole fractions of the different product species

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

Part 1 - b:

Code relating to the incomplete combustion assumption of the first segment of the preliminary design. (Problem 2)

Important variables:

K\_1[i] up until K\_6[i] Equilibrium constant

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

Part 2:

Code relating to the second segment of the preliminary design.

Important variables:

PPM Total NO emission of the combustor in ppm

C\_NO[z] the NO concentration at each stage of the combustor

C\_NO[1] is the value of the concentration after ER1 but before PFR1

C\_NO[2] is the value of the concentration after ER2 but before PFR2

C\_NO[3] is the value of the concentration after ER3 but before PFR3

C\_NO[4] is the value of the concentration after PFR3, which also is the value of the

concentration at the outlet of the entire combustor system

dC\_NOdt[z] The rate of change of the NO concentration at each stage of the combustor

C\_()[z] the concentration of the relevant product species at each stage of the combustor

rho[z] The density of the entire mixture at each stage of the combustor

t\_r[z] The residence time at each PFR

v[z] The speed of the mixture at each PFR

m\_dot\_cumulative[z] The total mass flowrate for air AND fuel at each stage of the combustor

RR\_1[z] up until RR\_2[z] The Rate of Reaction for the each of the reactions in the Zeldovich mechanism

k\_N1\_f[z] up until k\_N3\_f[z] The forward Rate Coefficients for the each of the reactions in the Zeldovich mechanism

k\_N1\_r[z] up until k\_N3\_r[z] The reverse Rate Coefficients for the each of the reactions in the Zeldovich mechanism