In the name of God

Mechanical Engineering Department, Ferdowsi University of Mashhad

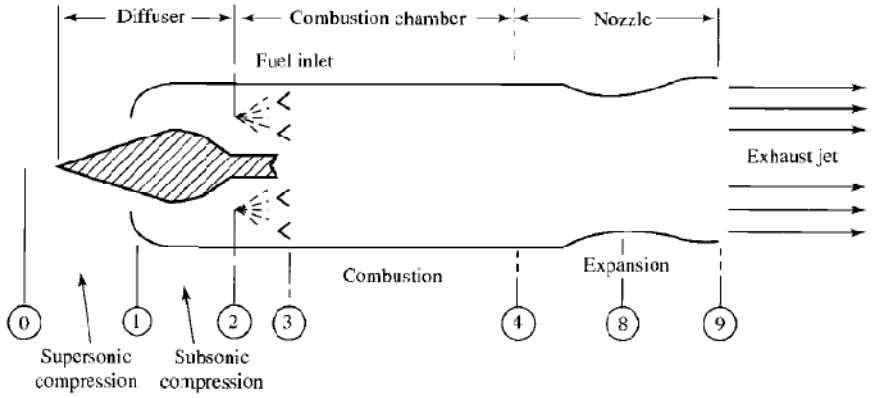
Advanced Propulsion Course Homework: Chapter 5

1) Show that for an ideal ramjet (assume f<<1) the thermal efficiency is given by:

$$\eta_{th}=\left(\frac{\lambda-1}{2}M_0^2\right)\Big/\left(1+\frac{\lambda-1}{2}M_0^2\right)$$

2) An ideal ramjet operates as a free stream Mach number of two. Assume γ=1.4, R=287 [m^2/sec^2K], C_p=1005 [m^2/sec^2K], and the fuel heating value is h_f= 4.28×10^7 [J/kg]. The ambient temperature and pressure are T_0=216 K and P_0= 2×10^4 [N/m^2].

- Plot the distribution of static pressure [P/P_0] between stations 1 and 9.



3) Problem 4, Chapter 5, Hill and Peterson
4) Problem 18, Chapter 5, Hill and Peterson