Section 4 Homework

- Develop an iterative solver for

$$\frac{A}{A^*} = \frac{1}{M}\left[\left(\frac{2}{\gamma+1}\right)\left(1+\frac{(\gamma-1)}{2}M^2\right)\right]^{\frac{\gamma+1}{2(\gamma-1)}}$$

- Use any programming language you prefer
i.e. Fortran, C++, MATLAB, …

- Clearly comment and document your code

Section 4 Homework (cont'd)

- Plot the Mach number, pressure, and temperature distribution along the SSME Nozzle for each of the following conditions

P_e=16.8727 KPa, P_0=20.4 Mpa, T_0=3500°K

Gas Properties:

, MW=22

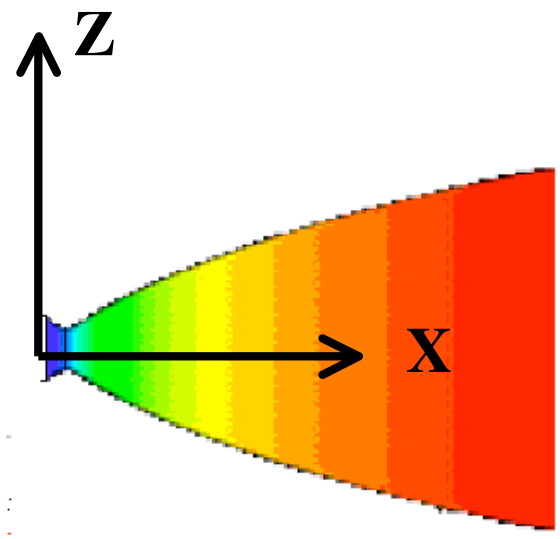
$$\gamma = 1.22$$

- Hint: make sure nozzle is choked first, then program all functions you might need

- Solve for Thrust and Isp in Vacuum

Section 4 Homework (cont'd)

- SSME Nozzle profile



- **Note: Changes to original geometry**

SSME Nozzle Profile

X, cm	+Z, cm	-Z, cm
0.00	17.50	-17.50
4.00	15.50	-15.50
8.00	13.00	-13.00
12.00	12.25	-12.25
16.00	13.00	-13.00
20.00	15.50	-15.50
25.00	18.50	-18.50
30.00	22.00	-22.00
50.00	33.00	-33.00
70.00	41.50	-41.50
90.00	50.50	-50.50
100.00	54.50	-54.50
120.00	61.00	-61.00
140.00	68.00	-68.00
160.00	74.50	-74.50
180.00	80.50	-80.50
200.00	86.00	-86.00
220.00	91.00	-91.00
240.00	97.00	-97.00
260.00	101.00	-101.00
280.00	105.00	-105.00
300.00	107.50	-107.50
305.00	107.85	-107.85