

AAE 4660 Aeropropulsion Systems  
 Computer Project #2  
 Fall 2009  
 Due: Monday, 9 November 2009

## Performance Comparison of Ideal Turbojet and Turbofan

Compare and discuss the performance of three ideal turbofan engines with an ideal turbojet engine at two flight conditions by completing the table below. The first flight condition (case 1) is at a flight Mach number of 0.9 at an altitude of 12km ( $T_0=216.7\text{K}$ ) and the second flight condition (case 2) at a flight Mach number of 2.6 and altitude of 18km ( $T_0=216.7\text{K}$ ). Note that the fuel/air ratio need to be calculated only once for each case since it is not a function of either  $\alpha$  or  $\pi_f$ . The other design parameters are

$$\begin{aligned} \pi_c &= 20 \\ T_{t4} &= 1,670 \text{ K} \\ c_p &= 1,004 \text{ kJ / (K kg)} \\ \pi_c &= 20 \\ \gamma &= 1.4 \\ h_{PR} &= 42,800 \text{ kJ/kg} \end{aligned}$$

Engine	$\alpha$	$\pi_f$	$\frac{V_9}{a_0}$	$\frac{V_{19}}{a_0}$	$\frac{F}{m_0}$	$f$	$S$
Turbofan							
a. Case 1	1	4					
Case 2	1	4					
b. Case 1, $\alpha^*$		4					
Case 2, $\alpha^*$		4					
c. Case 1, $\pi_f^*$	1						
Case 2, $\pi_f^*$	1						
Turbojet							
d. Case 1	0	n/a			n/a		
Case 2	0	n/a			n/a		

**Validation Points:**

$$F/\dot{m}_0 = 562.7 \text{ Ns/kg for case 1 of turbofan.}$$

## **REPORT FORMAT**

### **COVER (TITLE) PAGE**

### **ABSTRACT**

(<200 words. Summary of goal, approach, results and conclusions)

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### **INTRODUCTION**

(background, literature review, motivation, goal, objectives)

\*\*\*\* (The Body of the Report) \*\*\*\*

### **RESULTS AND DISCUSSION**

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### **CONCLUSIONS**

(Summary of accomplishments versus objectives, main results, recommendations)

### **ACKNOWLEDGEMENTS**

### **REFERENCES**

(Not bibliography, but only as cited in the text. Traceable and specific)

### **APPENDICES**

Please also visit websites, similar to the following, for technical report writing.

<http://www.nutsandboltsguide.com/apa.html>