Carter Fishback 23-09-2019

MET 440: Test 1 Reflection

1.) Learning Objectives Covered

The main learning objective covered in test 3 was transient flow of heat over time. In reality, perfectly insulated systems are rare and often heat up or cool down over time. Studying this concept contributes to the understanding of how heat is transferred over time and how an object will react accordingly. This test does, however, still require the knowledge expanded upon from the beginning of the semester. Without this basic knowledge of how energy is transferred, this test would be difficult to complete.

2.) Test Comparison (Lessons Learned)

Problem 1:

This problem was solved correctly and displayed the same answers as those provided in the solutions. Where I differed in my solution was when assuming diameter, D. I choose to, instead, assume a radius for the solution and then multiply by 2 to find the diameter at the end. The temperatures found at each of the requested radius' were within reason and met the given parameters.

Problem 2:

I completed this problem very closely to that of the solutions. However, I did not come to the correct answer exactly because of misunderstanding the question asked. I used the temperatures at the requested radius', parameters given, and the found radius from problem one to verify the solution. Using the equation found in problem one, I compared the numerical and analytical solutions of the temperature at each radius; I found that there was a slight error between the computed and derived solutions. The trend did prove that both methods of solving for r were effective. I did not come to an incorrect conclusion, but, did not iterate for r according to the solution posted.

3.) Estimated Grade

Writing		Problem 1			Problem 2		
Purpose (0.5/10.0)	0.5	1. Correct (T-Tinf)/(Ti-Tinf) equation	1/10	1	1. Right geometry	1/6	1
Drawings (1.0/10.0)	1	2. Compute alpha	1/10	1	2. Right material properties	1/6	1
Sources (0.5/10.0)	0.5	3. Iteration process	1/10	1	3. Right BC	1/6	1
Design considerations (1.0/10.0)	1	a. Assume "D"	1/10	0.9	4. Right initial conditions	1/6	1
Data and variables (0.5/10.0)	0.5	b. Biot to read table	1/10	1	5. Change "h" until matching Theta0	1/6	0
Procedure (2.5/10.0)	2	c. Get C1 and Ze1	1/10	1	6. Final result correctness	1/6	0.5
Calculations (2.0/10.0)	1.75	d. Theta0	1/10	1			
Summary (0.5/10.0)	0.5	4. Temperature at surface	1/10	1			
Materials (0.5/10.0)	0.5	5. Temperature at r=r0/2	1/10	1			
Analysis (1.0/10.0)	1	6. Final result correctness	1/10	1			
Total Points (x/10.0)	9.25						
Total Test Points	70.525						
Total Grade (Before HW Addition)	78.4%	Total Points		9.9	Total Points		4.5

Carter Fishback 23-09-2019

MET 440: Test 1 Reflection

4.) Final Thoughts

The primary mistake that I made while taking this test was not slowing down to think about how to approach the second problem. After looking at the solutions, I understand that I was supposed to iterate for r via COMSOL instead of solving for the requested radius' temperatures and comparing their numerical solutions on a graph. This attention to detail is necessary for my future success in the industry.

As stated previously, perfectly insulated systems in a steady heat generation state are very rare. Most systems found in "real-life" are going to change over time with energy that they absorb. This supports the need for engineers to understand the importance of how time does affect the flow of heat through convection and conduction.

After completing I have a better understanding of how heat generation can change over time. This test also solidified my ability to think through a complex problem of being given specific temperature parameters at a designated time, then design the geometry of a system to meet those requests. I used both Excel and COMSOL to solve this test; which, provided the opportunity to further hone my skill on these vital software systems used in the industry.