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Week 9
Intention
Goal: What do you want to achieve at the end of Week 9? To get a better understanding on heat transfer with a more in-depth explanation on specific scenarios compared to vague concepts.
Desired Outcomes—learning outcomes I want to achieve in MECH 3228
Discuss the topics that seemed most interesting to you and where you anticipate you will use them. To see the applications of fluid mechanics in Heat transfer and show how closely related these topics are with all the scenarios and ways to approach questions.
Self-Understanding—strengths that I can build on and development needs I can address to be successful in MECH 3228
Strengths: My strengths are notetaking and concentrating in class, which will both be very helpful when studying later for tests/assignments. Development Needs: Time management outside of class and organizing it so everything is studied as need be.

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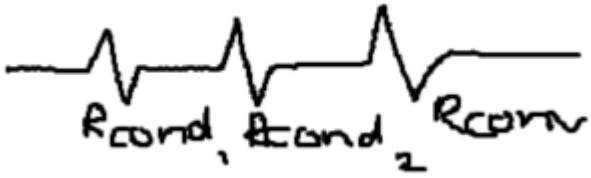
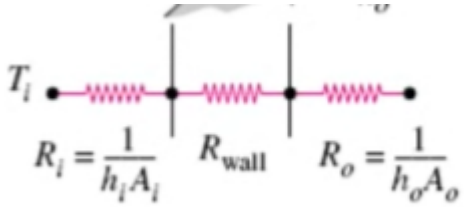
LECTURE CONTENT
What are common types of heat exchangers? Double pipe heat exchangers, Compact heat exchanger, Shell and Tube heat exchanger, plate and frame heat exchanger.
Draw the thermal resistance network for a parallel flow double pipe heat exchanger. Does the thermal resistance network change for a counter flow?    No, it doesn't change for counter flow. 
When is the UA product of the inner fluid equal to that of the outer fluid? It is the same only if the area of the outer and area of the inner paths are the same.
Which heat transfer coefficient dominates the overall heat transfer coefficient, U? When the heat transfer coefficient of the inner is higher the outer is dominant, and when the outer is much higher than the inner heat transfer coefficient the inner heat transfer coefficient is more dominant.
What is fouling and how does the thermal resistance network change as a result of it? The layer of deposits represents additional resistance to heat transfer and causes the rate of heat transfer in a heat exchanger to decrease. The overall heat transfer coefficient needs to be modified to account for the effects of fouling on both the inner and the outer surfaces of the tube. $R = \frac{1}{h_i A_i} + \frac{R_{f,i}}{A_i} + \frac{\ln(D_0/D_i)}{2\pi kL} + \frac{R_{f,o}}{A_o} + \frac{1}{h_o A_o}$
What are the assumptions necessary to simplify the analysis of heat exchangers? - Steady flow conditions - Kinetic and potential energy changes are negligible - The specific heat of a fluid is constant - Axial heat conduction along the tube is negligible - The outer surface of the heat exchanger is perfectly insulated

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What does the fluid undergo in a boiler or condenser and how is the heat transfer rate expressed? One of the fluids in a condenser or a boiler undergoes a phase change process, and the rate of heat transfer: $\dot{Q} = \dot{m}h_{fg}$
When comparing a parallel flow with a counter flow double pipe heat exchanger, which is better? Why? A smaller surface area is needed to achieve a specific heat transfer rate in a counter flow heat exchanger. For parallel, when the temperature change is constant and the Ch=Cc therefore makes the cold = heat. For the counter flow, the change in temperature 1 equals to the change in temperature 2 which leads to an indeterminant temperature mean, which makes it equal to temp 1 and temp2 changes.
How is the log mean temperature difference expressed for multipass or a cross-flow heat exchanger? Log mean temperature difference relation as: $\Delta T_{lm} = F\Delta T_{lm,CF}$, where the F is the correction factor and delta Tm , cf is the log mean temperature for counter flow cases.