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Week 6
Intention
Goal: What do you want to achieve at the end of Week 6? To get a better understand 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. I want to learn more about the lumped analysis approach as all courses use this attempt in various other ways and I'm curious how heat transfer is able to use it.
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 is the necessary condition that must be satisfied in order to apply the lumped system analysis? The temperature of a body approaches the ambient temperature T exponentially. The Biote number must be less than 0.1 or equal to for the lumped system analysis to be applied. $Bi = \frac{L_c/k}{1/h}$
Does the steady state analysis hold in the lumped system analysis? No, it doesn't as it doesn't depend on time dependence. The time and temperature do change as the temperature of a body approaches the ambient temperature exponentially.
What is the Nusselt number? Enhancement of heat transfer through a fluid layer as a result of convection relative to conduction across the same fluid layer.
What is Prandt number? The relative thickness of the velocity and the thermal boundary layers is best described by the dimensionless Prandtl number. $Pr = \frac{\text{molecular diffusivity of momentum}}{\text{molecular diffusivity of heat}} = \frac{\mu C_p}{k}$
What are the two modes of heat transfer observed in convection? Natural Convection: Fluid motion is not generated by any external source. Forced Convection: Fluids are forced to move in order to increase the heat transfer.
How is Pr different in liquid metals, oils and gasses? Heat diffuses very quickly in liquid metals so Pr is very small compared to 1. The thermal boundary layer is much thicker for liquid metals and much thinner oils relative to the velocity boundary layer.
What are the three equations that must be applied to derive the differential equations for convection? Conservation of mass, conservation of momentum and conservation energy are all used for the derivation of differential convection equations.
What are the necessary assumptions to apply the equations? -Steady two dimensional flow -Newtonian Fluid -Constant properties -Laminar Flow