

Learning activities before - Lecture 6:

To make the session more efficient we would like to ask you to do some preparation beforehand. This will help you to be prepared for the lecture in advance by having the overall view of the content.

The learning objective of the session are:

- Time dependent heat transfer problems
- Distinguish practical examples
- “Derive” mathematical approximation
- Determining validity of approximation

Please prepare yourself in the following way:

Question to make you think:

How long will take for my coffee to cool down to certain temperature ?

TRANSIENT HEAT CONDUCTION

The temperature of a body, in general, varies with time as well as position. In rectangular coordinates, this variation is expressed as $T(x, y, z, t)$, where (x, y, z) indicates variation in the x , y , and z directions, respectively, and t indicates variation with time. In the preceding lectures, we considered heat conduction under steady conditions, for which the temperature of a body at any point does not change with time. This certainly simplified the analysis, especially when the temperature varied in one direction only, and we were able to obtain analytical solutions. In this lecture, we consider the variation of temperature with time in one-dimensional systems.

LUMPED SYSTEM ANALYSIS

In heat transfer analysis, some bodies are observed to behave like a “lump” whose interior temperature remains essentially uniform at all times during a heat transfer process. The temperature of such bodies can be taken to be a function of time only, $T(t)$. Heat transfer analysis that utilizes this idealization is known as lumped system analysis, which provides great simplification in certain classes of heat transfer problems without much sacrifice from accuracy.

We are going to discuss more about **LUMPED SYSTEM ANALYSIS** in this session.

Learning activities after - Lecture 6:

You have joined the Sixth Lecture of our E&H course. Below you will find some activities that will help you to bring your learning into practice and/or to learn more about the topics that were addressed.

Transient Heat Conduction Questions

Try to think and find out the answers for below questions :

1. What is transient heat conduction?
2. What is lumped system?
3. What is **Biot Number**?
4. How to calculate transient temperature for lumped system?
5. Can you define the characteristics length for Biot number ?
6. Can you define the difference between Biot Number and Nusselt Number ?

please watch below video which will show you the basic of transient heat conduction for lumped systems:

https://www.youtube.com/watch?v=QOtecMidRek&feature=emb_imp_woyt

Please watch below video which will show you the experiment of transient heat conduction for lumped systems:

https://www.youtube.com/watch?v=hWzdZsmyTio&feature=emb_imp_woyt

Please watch below video which will show you the example for the transient heat conduction for lumped systems:

<https://www.youtube.com/watch?v=CwkUb-A8Ncg>