Module 5: Learning objectives

- The primary objective of this chapter is to learn various methods of treating transient conduction which occurs in numerous engineering applications. The student should learn to recognize several classes of problems in unsteady conduction, and should be able to apply appropriate simplicity conditions before attempting to solve the problems.
- The simplest case is the lumped capacity condition, and the student should understand under what conditions one can apply this assumption. The first thing a student should do is calculate the Biot number. If this number is much less than unity, he/she may use the lumped capacitance method to obtain accurate results with minimum computational requirements.
- However, if the Biot number is not much less than unity, spatial effects must be considered and some other method must be used. Analytical results are available in convenient graphical and equation form for the plane wall, the finite cylinder, the sphere, and the semi-infinite solid. The student should know when and how to use these results.
- If geometrical complexities and /or the form of the boundary conditions preclude the use of analytical solutions, recourse must be made to an approximate numerical technique, such as the finite difference method or the finite volume method.