

Determination of the Thermal Conductivity and Thermal Diffusivity of Materials using Fin Heat Transfer Theory

D. Hurley^S and A. Campo^C

*Dept. of Mechanical Engineering, The University of Vermont, Burlington, VT, U.S.A.
acampo@uvm.edu*

A material molded as a long pin fin is kept at an ambient temperature. At a certain time, the fin base is elevated to a pre-set temperature. As a result, heat begins to be conducted through the pin fin and rejected to the ambient air by convection. During the initial transient period, the unsteady heat equation for a long pin fin will be treated with the Transversal Method Of Lines (TMOL), and the thermal diffusivity of the material will be estimated from the analytic solution of the differential-difference heat equation. Under steady-state conditions, the analytic solution of the heat equation for a long pin fin will be used to estimate the thermal conductivity of the material. The simple two-part methodology will provide an interesting experiment for heat/fluid flow laboratories in mechanical and chemical engineering programs.