Application of the Hot Wire Technique and COMSOL Multiphysics for Heat Transfer Monitoring in Solids

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Abstract

We applied the Hot Wire (HW) technique and COMSOL Multiphysics software to study the heat transfer of a homogeneous and isotropic solid material. The HW technique is based on the application of a linear power density modulated by a square pulse of heat in a specific time period. The power density is applied over the symmetry axis of the sample to produce a radial heat flux and then, to determine the thermophysical properties like specific heat, thermal conductivity and thermal diffusivity. In this work, the solutions of the transient heat transport equation by means of the finite element technique with appropriate boundary conditions are reported. Finally, we compared our simulated results with the experimental ones and some approximate mathematical models with a good agreement. These results show the utility of this methodology in the study of thermal properties in solids.

Reference

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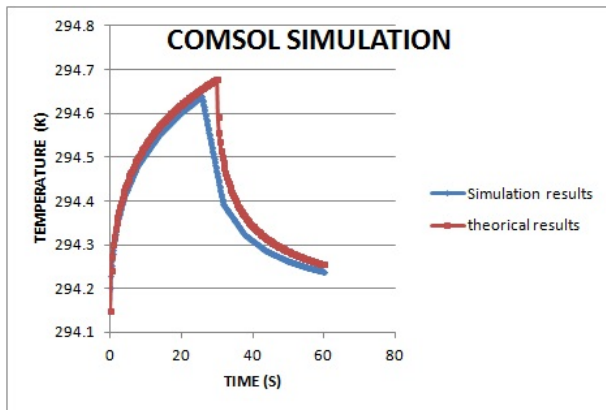
Figures used in the abstract

Figure 1: Temperature vs. time.