

Experimental Investigation Of Heat Transfer Of Horizontal Thin Plate

Prepared by: R. Vicnesvaran

ABSTRACT

House heating system becomes a basic necessity in Europe and Asia as warm air heating systems and hot water-for the households. Due to multiple manufacturers, every household has different radiator material for their house heating system. Therefore, the radiator materials are the key of how effectiveness the heat convection happens at a certain area. This research presents an experimental investigation of heat transfer of horizontal thin plates. The objective of this research is to design experimental studies of heat transfer convection on horizontal thin plates. Next, is to investigate forced and natural convection on horizontal thin plates by using infrared camera and determine the effect of heat transfer convection on three type materials of thin plates. The convection that involved in this thesis is natural and forced convection but forced convection has varied for three different wind speeds. For natural convection, the dimensionless parameter which is Rayleigh number and Nusselt number is determined and for forced convection, Reynolds number and Nusselt number is determined. The dimensionless parameters are important in order to determine the rate of heat transfer. The result that obtained in this research for dimensionless parameter is compared and discussed. By obtaining the values of dimensionless parameter, the rate of heat transfer is determined. For natural convection, the aluminium has the highest rate of heat transfer that transferred to surrounding with the value of 11.66 Watt compared with stainless steel which is 9.55 Watt and cast iron which is 8.51 Watt. For forced convection, at wind speed of 2.3 m/s, aluminum has the highest rate of heat transfer which is 20.7 Watt compared with stainless steel which is 19.86 Watt and lowest will be cast iron at 14.68 Watt. For the wind speed of 4.1 m/s, aluminium has the highest rate of heat transfer which is 29.42 Watt compared with stainless steel which is 27.22 Watt and lowest will be cast iron at 26.82 Watt. For the 5.2 m/s, aluminium has the highest rate of heat transfer which is 34.29 Watt compared with stainless steel which is 31.62 Watt and lowest will be cast iron at 29.6 Watt. Eventually, this investigation is concluded and recommendations for future work are suggested.