New Fields

Ability to separate Radiation from Convection



Goal Separate radiation heat dissipation from convection heat dissipation in a simple way. Measurement Method First, by considering the fact that that convection Fig. 1 Separation Idea Measurement Value heat dissipation is constant even if the radiation rate Radiation Amount (W/m²) changes, as shown on Fig.1, we considered it to Measurement Radiation correspond to the intercept of zero radiation rate on Value **Heat Dissipation** the graph and the straight line connecting the measured values of α 2 and α 3. By applying the radiation rate of the object $\alpha 1$ to it, it is possible to Convection simply obtain radiation and convection separately. Heat Dissipation a 2 (0.05) α_1 α_{3} (0.86) **Radiation Rate** Heat flux sensor will be used (L Size) (1) Convection heat radiation sensor: rate 0.05 (α 2) Fig. 2 (2) Standard heat flux sensor: rate 0.86 (a3) The radiation rate of the object (α 1) shall be 0.7. A Heat flux senso As shown on Fig. 2, the heat flux sensors 1 and 2 are installed on the object and measure its heat R Too radiation. To see the change, we seek both the natural and forced convections. Hot Plate Results Measurement results in natural convection were Measurement Results (W/m²) (1)176 W/m², (2)325 W/m², and the value of the 1,000 graph intercept with zero radiation rate was 168 (Forced Convection) 900 W/m². If we apply this to the object radiation rate, we Convection Heat Dissipation Sensor Standard Sens subtract the convection heat dissipation of 168 W/m² 800 ----from the total heat dissipation of 300 W/m², thus 70W/m obtaining a radiation heat dissipation of 132 W/m². 700 ction Heat Dissipation 720W/m 600 In the same way, if we calculate by forced convection, we obtain 70 W/m² (790 - 720= 70). 500 400 @325W/m (Natural Convection) Object :0. 300 ①176W/m 132W/m 200 onvection Heat Dissipation : 168W/m 100 0 0.00 0.10 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00 **Badiation Bate** Considerations

Radiation and convection can be separated using two types of heat flux sensors with different radiation rates. Based on this, the heat flux sensor can be used for heat management and optimum design in the automotive and construction fields.

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