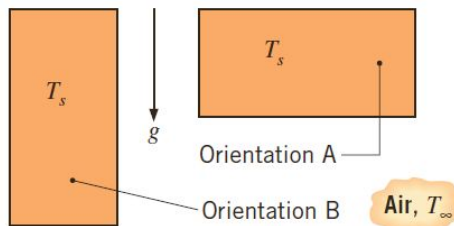
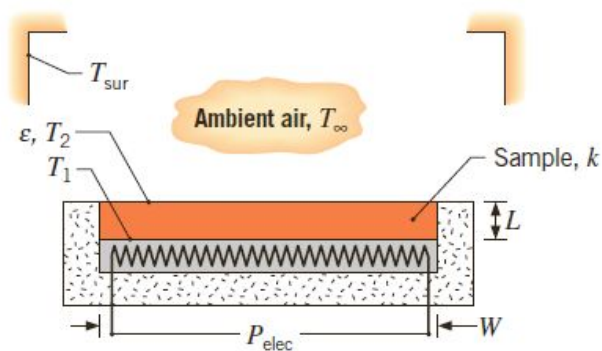


- 9.17 Consider a vertical plate of dimension  $0.25 \text{ m} \times 0.50 \text{ m}$  that is at  $T_s = 100^\circ\text{C}$  in a quiescent environment at  $T_\infty = 20^\circ\text{C}$ . In the interest of minimizing heat transfer from the plate, which orientation, (A) or (B), is preferred? What is the convection heat transfer from the front surface of the plate when it is in the preferred orientation?



- 9.53 A horizontal uninsulated steam pipe passes through a large room whose walls and ambient air are at  $300 \text{ K}$ . The pipe of  $150\text{-mm}$  diameter has an emissivity of  $0.85$  and an outer surface temperature of  $400 \text{ K}$ . Calculate the heat loss per unit length from the pipe.

- 9.39 The thermal conductivity and surface emissivity of a material may be determined by heating its bottom surface and exposing its top surface to quiescent air and large surroundings of equivalent temperatures,  $T_\infty = T_{\text{sur}} = 25^\circ\text{C}$ . The remaining surfaces of the sample/heater are well insulated.



- Consider a sample of thickness  $L = 25 \text{ mm}$  and a square planform of width  $W = 250 \text{ mm}$ . In an experiment performed under steady-state conditions, temperature measurements made at the lower and upper surface of the sample yield values of  $T_1 = 150^\circ\text{C}$  and  $T_2 = 100^\circ\text{C}$ , respectively, for a power input of  $P_{\text{elec}} = 70 \text{ W}$ . What are the thermal conductivity and emissivity of the sample?