PROBLEM 1.86(b)

KNOWN: Physical mechanism for microwave heating.

FIND: Comparison of (a) cooking in a microwave oven with a conventional radiant or convection oven and (b) a microwave clothes dryer with a conventional dryer.

(a) Microwave cooking occurs as a result of volumetric thermal energy generation *throughout* the food, without heating of the food container or the oven wall. Conventional cooking relies on radiant heat transfer from the oven walls and/or convection heat transfer from the air space to the surface of the food and subsequent heat transfer by conduction to the core of the food. Microwave cooking is more efficient and is achieved in less time.

(b) In a microwave dryer, the microwave radiation would heat the water, but not the fabric, directly (the fabric would be heated indirectly by energy transfer from the water). By heating the water, energy would go directly into evaporation, unlike a conventional dryer where the walls and air are first heated electrically or by a gas heater, and thermal energy is subsequently transferred to the wet clothes. The microwave dryer would still require a rotating drum and air flow to remove the water vapor, but is able to operate more efficiently and at lower temperatures.