

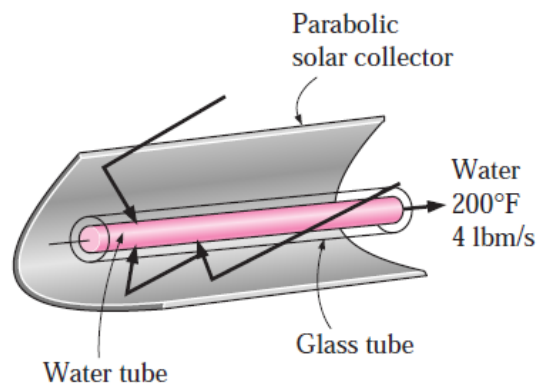
Mech 262 – Thermo & Heat Transfer

Assignment 5

Question 1

The hot-water needs of a household are to be met by heating water at 55°F to 200°F by a parabolic solar collector at a rate of 4 lbm/s. Water flows through a 1.25" ID thin aluminum tube whose outer surface is black anodized in order to maximize its solar absorption ability. The centerline of the tube coincides with the focal line of the collector, and a glass sleeve is placed outside the tube to minimize the heat losses. If solar energy is transferred to water at a net rate of 350 BTU/Hr per ft length of the tube, do the following:

- Convert this problem to SI units.
- Determine the required length of the parabolic collector to meet the hot-water requirements of this house.
- Determine the surface temperature of the tube at the exit.



Question 2

A house built on a riverside is to be cooled in summer by utilizing the cool water of the river, which flows at an average temperature of 15°C. A 15 m long section of a circular duct of 20 cm diameter passes through the water. Air enters the underwater section of the duct at 25°C at a velocity of 3 m/s. Assume the surface of the duct to be at the temperature of the water. Determine:

- The outlet temperature of air as it leaves the underwater portion of the duct.
- The rate of heat transferred from the air to the water.

