Consider the long concentric cylinders with diameters $D_1$ and $D_2$ and surface areas $A_1$ and $A_2$.

Express the view factors $F_{22}$ in terms of the cylinder diameters.

1) $F_{22} = \frac{D_2}{D_1}$

2) $F_{22} = 1 - \frac{D_2}{D_1}$

3) $F_{22} = 1 - \frac{D_2}{D_2}$

4) None of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

$F_{22} = 1 - \frac{D_1}{D_2}$

2) Consider the right-circular cylinder of diameter $D$, length $L$, and the areas $A_1$, $A_2$, and $A_3$ representing the base, inner, and top surfaces, respectively.

Find out the view factor between the base of the cylinder and the inner surface. Consider, $H = \frac{L}{D}$

$F_{12} = 2H \left[1 + \frac{H^2}{2} - H\right]$
Consider the right-circular cylinder of diameter $D$, length $L$, and the areas $A_1$, $A_2$, and $A_3$ representing the base, inner, and top surfaces, respectively.

Find out the view factor for the inner surface to itself. Consider $H = L/D$.

$$F_{12} = 2H \left[ (1 - H^3)^{1/3} - H \right]$$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$$F_{12} = 2H \left[ (1 + H^2)^{1/2} - H \right]$$

3) Consider the right-circular cylinder of diameter $D$, length $L$, and the areas $A_1$, $A_2$, and $A_3$ representing the base, inner, and top surfaces, respectively.

$$F_{22} = 1 + H + \left( 1 + H^2 \right)^{1/3}$$
$$F_{22} = 1 + H - \left( 1 + H^2 \right)^{1/2}$$
$$F_{22} = 1 + H + \left( 1 + H \right)^{1/2}$$
$$F_{22} = 1 + H - \left( 1 + H \right)^{1/3}$$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$$F_{22} = 1 + H - \left( 1 + H^2 \right)^{1/2}$$

4) A drying oven consists of a long semicircular duct of diameter $D = 1 \text{ m}$.

Materials to be dried cover the base of the oven while the wall is maintained at $1200 \text{ K}$. What is the drying rate per unit length of the oven ($\text{kg/s} \cdot \text{m}$) if a water-coated layer of material is maintained at $325 \text{ K}$ during the drying process? Blackbody behavior may be assumed for the water surface and the oven wall.

Properties: $h_{fg} = 2.378 \times 10^8 \text{ J/kg}$

0.05 $\text{ kg/s} \cdot \text{m}$
0.50 $\text{ kg/s} \cdot \text{m}$
0.32 $\text{ kg/s} \cdot \text{m}$
1.20 $\text{ kg/s} \cdot \text{m}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
0.05 $\text{ kg/s} \cdot \text{m}$

5) Consider two aligned, parallel, square planes ($0.4 \text{ m} \times 0.4 \text{ m}$) spaced $0.8 \text{ m}$ apart and maintained at $T_1 = 500 \text{ K}$ and $T_2 = 800 \text{ K}$. Calculate the net radiative heat transfer from surface 1 for the following special condition:

Both planes are black and the surroundings are at $0 \text{ K}$. Consider the view factor to be .
Consider two aligned, parallel, square planes (0.4 m × 0.4 m) spaced 0.8 m apart and maintained at $T_1 = 500 \, K$ and $T_2 = 800 \, K$. Consider the view factor to be $F_{12} = F_{21} \approx 0.075$. Calculate the net radiative heat transfer from surface 1 for the following special condition:

Both planes are black with connecting, reradiating walls.

You can use the following relationship.

$$ q_1 = \frac{A_1(E_1 - E_2)}{F_{12} + \left( \frac{1}{F_{1R}} + \frac{1}{F_{2R}} \right)^{-1} - 1} $$

-1692.53 W
-1045.59 W
-958.32 W
-208.29 W

No, the answer is incorrect.
Score: 0
Accepted Answers:
-1692.53 W