PROB. 13-12

3 INFINITELY LONG PARALLEL CYLINDERS, DISTANCES APART, FIND VIEW FACTOR BETWEEN MIDDLE CYLINDER AND SURROUNDINGS.

CROSSED STRINGS METHOD

\[ F_{ij} = \frac{1}{2} \left( \text{CROSSED STRINGS} \right) - \frac{1}{2} \left( \text{UNCROSSED STRINGS} \right) \]
\[ F_{21} = \frac{(L_3 + L_4) - (L_1 + L_2)}{2W_2} \]
\[ L_1 = L_2 = 5, \quad L_3 = L_4 = \sqrt{D + S^2}, \quad W_2 = \frac{1}{2}(\pi D) \]

\[ F_{21} = \frac{2\sqrt{D + S^2} - 2S}{2\left(\frac{1}{2}\pi D\right)} = \frac{2}{\pi D} \left(\sqrt{D + S^2} - S\right) \]

BY SYMMETRY, \( F_{23} = F_{21} \)

SUMMATION RULE:

\[ F_{21} + F_{22} + F_{23} + F_{24} = 1 \]
\[ F_{24} = \frac{1}{2} - 2 F_{21} \]

\[ F_{24} = 1 - 2 \cdot \frac{2}{\pi D} (\sqrt{D + s^2} - s) \]

\[ F_{24} = 1 - \frac{4}{\pi D} (\sqrt{D + s^2} - s) \]