

National Program on Technology Enhanced Learning

CONDUCTION AND RADIATION

Assignment - 1

1. Make suitable assumptions wherever required with justification
 2. Assume any missing data
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- (1) In a regular closed hexagonal duct what is the total number of view factors? How many independent view factors need to be determined?
- (2) Consider a rectangular box type enclosure. This enclosure (radiation from the outer surfaces of the six walls is not part of the analysis) is cut vertically at the middle so that the top and bottom surfaces are divided into two surfaces each. The two surfaces now constituting the top are 1 and 4 while the two at the bottom are 3 and 4 with 3 placed right below 1. Each area is denoted using the letter A followed by the subscript. For example, the area of surface is A_1 . Show that for this enclosure, the view factor F_{12} is given by

$$F_{12} = \frac{1}{2A_1} [A_{14}F_{14-23} - A_1F_{13} - A_4F_{42}]$$

- (3) The view factor between two infinitely long directly opposed parallel plates of finite width L is F_{12} . The plates are separated by a distance D.
 - (a) Derive an expression for F_{12} by integration of the view factor between parallel differential strip elements.
 - (b) Derive an expression for F_{12} by the crossed string method.