The Log Mean Temperature Difference Method (LMTD)

- The Logarithmic Mean Temperature Difference(LMTD) is valid only for heat exchanger with one shell pass and one tube pass.
- For multiple number of shell and tube passes the flow pattern in a heat exchanger is neither purely co-current nor purely counter-current.
- The temperature difference between the hot and cold fluids varies along the heat exchanger.
- It is convenient to have a *mean temperature difference* T_m for use in the relation.

$$\dot{Q} = UA_s \Delta T_m$$

THE EFFECTIVENESS-NTU METHOD

- LMTD method is useful for determining the overall heat transfer coefficient U based on experimental values of the inlet and outlet temperatures and the fluid flow rates.
- A more convenient method for predicting the outlet temperatures is the effectiveness NTU method.
- This method can be derived from the LMTD method without introducing any additional assumptions.
- Therefore, the effectiveness-NTU and LMTD methods are equivalent.
- An advantage of the effectiveness-NTU method is its ability to predict the outlet temperatures without resorting to a numerical iterative solution of a system of nonlinear equations. The heat-exchanger effectiveness ε is defined as

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