OLI Tips #21

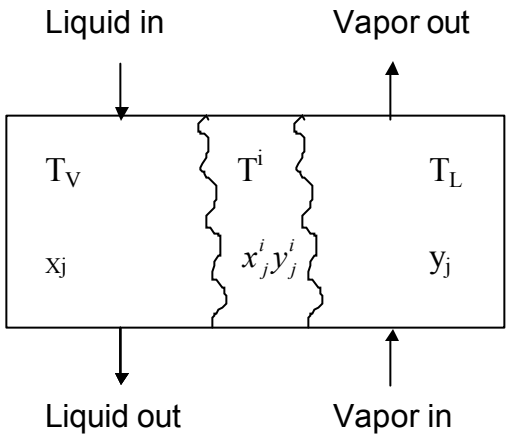
Using Mass Transfer Towers

To select a mass transfer tower as a model, you select multistage blocks and then select absorber or stripper. The program will then ask if you want a mass transfer tower.

The mass and heat transfer coefficients along with the interfacial area are entered via the parameters option on the action bar. At least one value should be entered for the vapor and liquid overall mass transfer coefficient. Values for stages not entered are interpolated. If component mass transfer coefficients are desired, answer ***yes*** when the option is displayed. The values entered for component mass transfer will override the overall values entered, any component not specified will have the value entered for the overall coefficient.

The larger the mass and heat transfer coefficient, the closer the tower will be to equilibrium conditions. For a gas-liquid tower the major resistance is normally on the mass transfer coefficient on the vapor side of the interface. In such a case the liquid side coefficient is set large and the vapor side coefficient adjusted to match experimental results. The heat transfer coefficients are normally set large.

Column Stage



x_j - bulk liquid composition
y_j - bulk vapor composition
x_j^i - liquid interface composition
y_j^i - vapor interface composition

T_V - Bulk vapor temperature
T_L - Bulk Liquid temperature
T^i - Interface temperature

$Y_j^i \; ? \; K_j * X_j^i$ - interface at equilibrium

$\text{Tmole}_j = a * MV_j * (Y_j \; ? \; Y_j^i)$

$\text{Tmole}_j = a * ML_j * (X_j^i \; ? \; X_j)$

$\text{Heat} \;\; = a * HV(T_V \; ? \; T^i)$

$\text{Heat} \;\; = a * HL(T^i \; ? \; T_L)$

where:

a - transfer area
MV_j - Vapor component mass transfer coefficient
ML_j - Liquid component mass transfer coefficient
HV - Vapor heat transfer coefficient
HL - Liquid heat transfer coefficient
Tmole_j - l-moles/hr of component j transfer across interface
Heat - Btu/hr transfer across interface