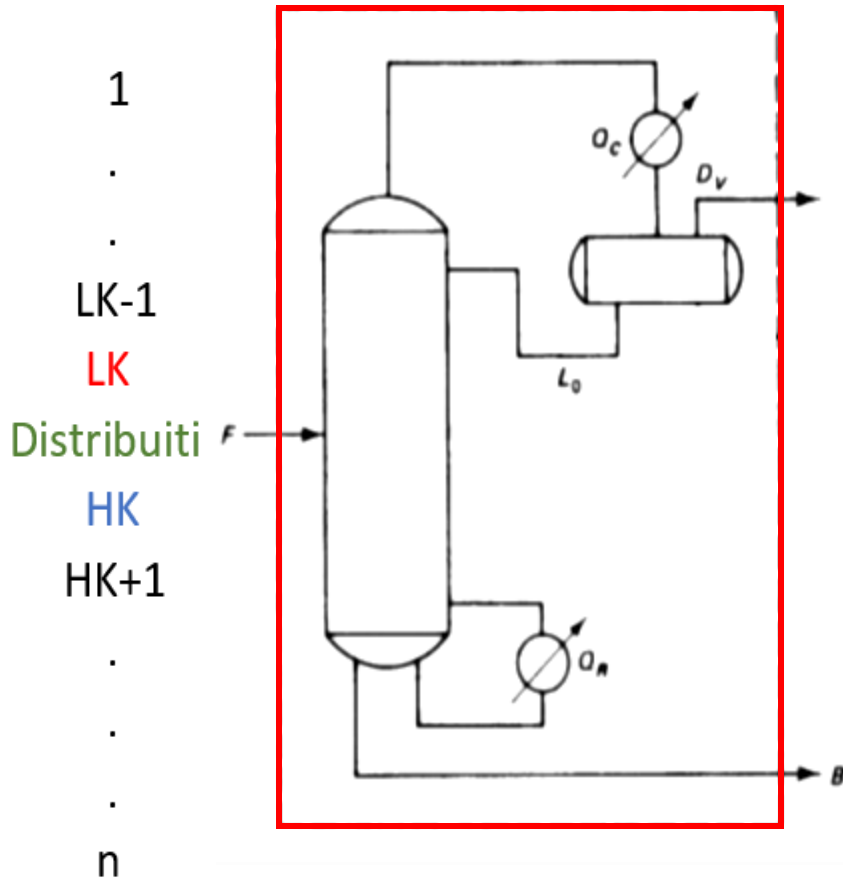


Multicomponent

❖ Bilancio globale di materia



Quantità imposte

- $y_{D_V}^{HK}$
- x_B^{LK}
- $Rid \begin{cases} D_{sott} = Rid \cdot (F \cdot \sum_{i=1}^{LK-1} x_F^i) \\ D_{sum} = Rid \cdot (F \cdot \sum_{i=HK+1}^n x_F^i) \end{cases}$
- $Rid_dist \longrightarrow Rid_dist \cdot (F \cdot X_F^{Distribuiti}) = D_V X_{Distribuiti}$

$$\left\{ \begin{array}{l} D_V = \left(F \cdot \sum_{i=1}^{LK-1} x_F^i \right) - D_{sott} + F \cdot x_F^{LK} - B \cdot x_B^{LK} + D_V \cdot x_{Distribuiti} + D_V \cdot y_{D_V}^{HK} + D_{sum} \\ B = D_{sott} + B \cdot x_B^{LK} + D_V (1 - X_{Distribuiti}) + F \cdot x_F^{HK} - D_V \cdot y_{D_V}^{HK} + \left(F \cdot \sum_{i=HK+1}^n x_F^i \right) - D_{sum} \end{array} \right.$$

Multicomponent

❖ Bilancio globale di materia

```
%BILANCIO DI MATERIA GLOBALE

Dsum=Rid*(sum(Fwt(HK+1:N)));
Dsot=Rid*(sum(Fwt(1:LK-1)));

B1_=[sum(Fwt(1:LK))+Rid_dist*sum(Fwt(LK+1:HK-1));
      sum(Fwt(HK:N))+((1-Rid_dist)*sum(Fwt(LK+1:HK-1)))];
B_=[B1_(1)+Dsum-Dsot B1_(2)-Dsum+Dsot]; % vettore dei termini noti

A=[1-DwtHK    BwtLK
    DwtHK      1-BwtLK]; %matrice dei coefficienti

% Algoritmo di Gauss
C=(inv(A))';
X=B_*C; %vettore delle incognite D e B

Dwt_tot=X(1); %portata mssica distillato
Bwt_tot=X(2); %portata massica bottom
```

Multicomponent

❖ Condensatore

```
% CONDENSATORE

% Dew point calculation, per stabilire la temperatura del condensatore e la composizione di Lo
% Tip ---> P°----> Kvalue=P°/P ----> Xd=Yd/Kvalue ----> Verifica: sommatoria(Xd)=1

Tmax=Teb(N);
Tmin=Teb(1);

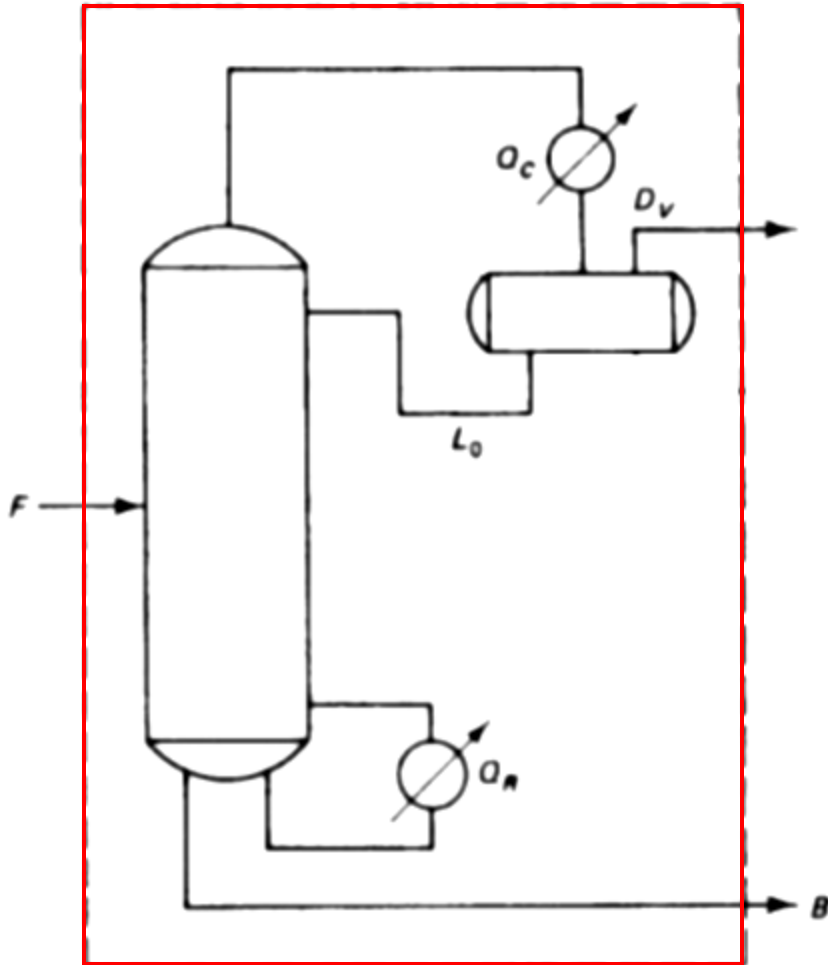
for j=1:50
    Tcond=(Tmax+Tmin)/2;

    for i=1:N
        % [Po(i)]=ANTOINE(Tcond,ant(i,1),ant(i,2),ant(i,3));
        [Po(i)]=PENG_ROBINSON(Tcond,w(i),Tc(i),Pc(i));
    end
    P1(j,:)=Po;
    Kvalue=Po/(P*760);
    XLomoli=YDmoli./Kvalue;
    sommatoriaX=sum(XLomoli);

    if sommatoriaX<1
        Tmax=Tcond;
    else Tmin=Tcond;
    end
end
```

Multicomponent

❖ Ribollitore



Calcolo della temperatura del ribollitore e della composizione di V_1

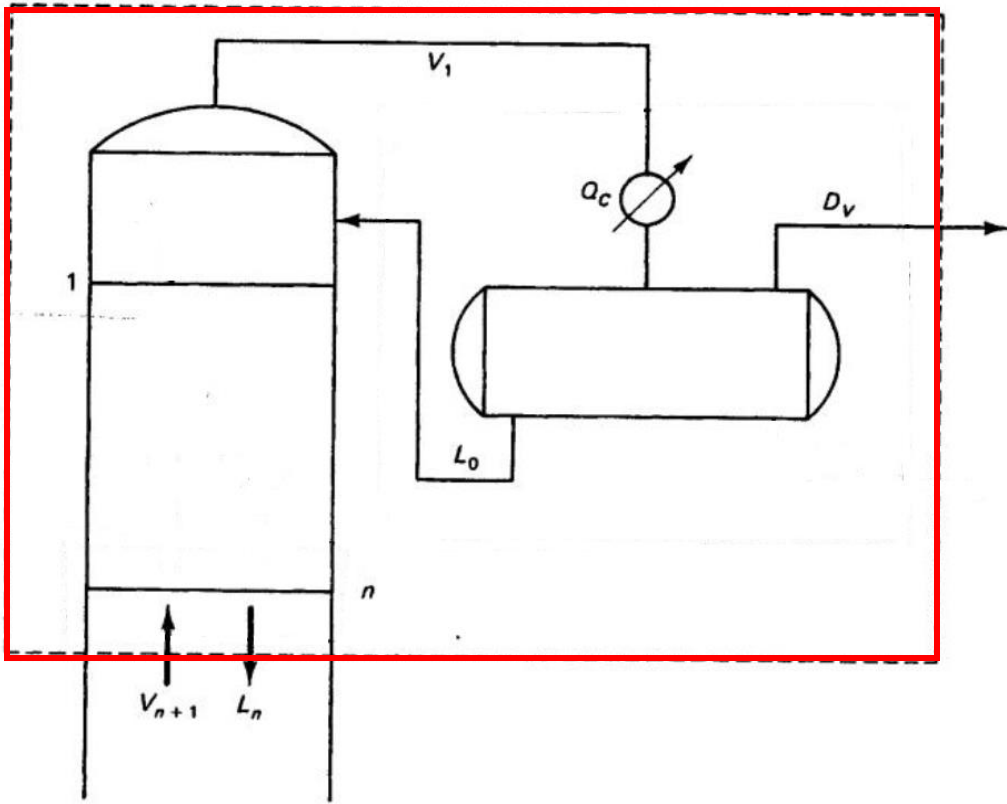
$$x_B^i \rightarrow T^{ip} \rightarrow K_i \rightarrow \text{se } \sum_{i=1}^N x_i \cdot K_i = 1, T^{ip} \text{ è corretta} \rightarrow T_{rib}, y_{V_1}^i$$

Bilancio di energia sul sistema globale per determinare Q_R

$$Q_R = B \cdot h_B + D_V \cdot H_{D_V} - F \cdot h_F + Q_C$$

Multicomponent

❖ Sezione di arricchimento



$$\text{Se } \text{abs} \left(\frac{X_{LK_n}}{X_{HK_n}} - \frac{X_{LK_F}}{X_{HK_F}} \right) > \text{tolleranza}$$

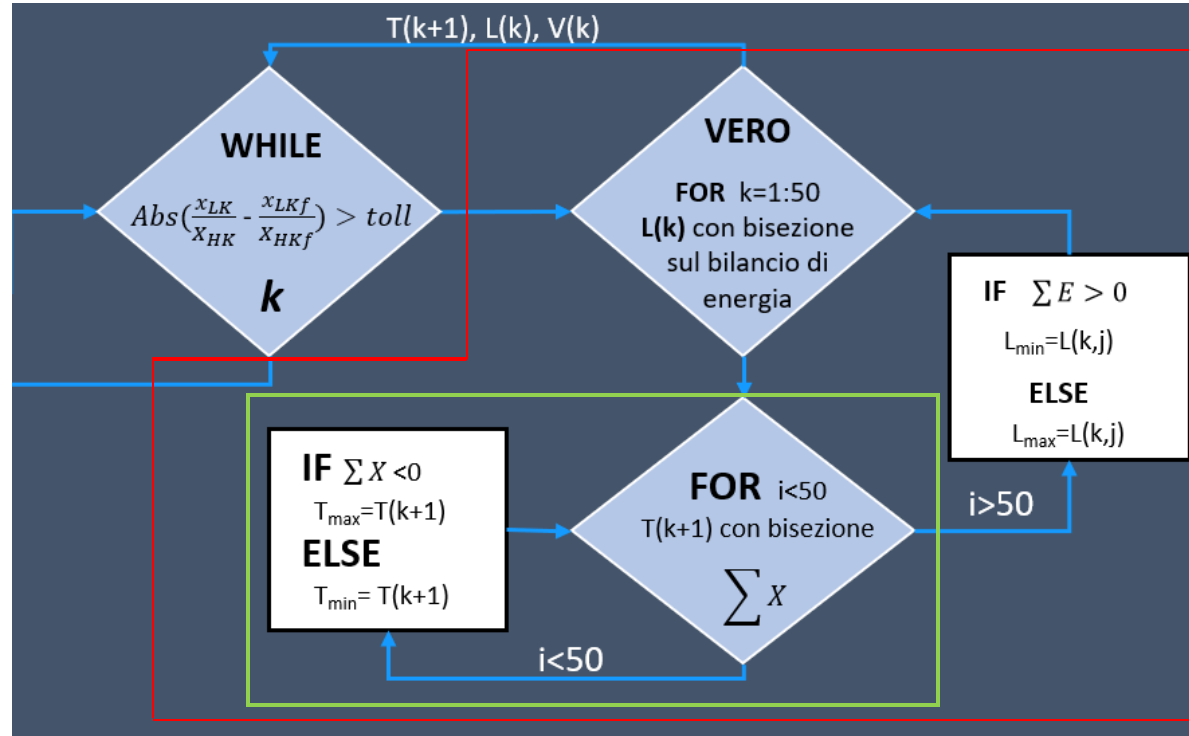
$$L_n^{ip} \rightarrow V_{n+1} = L_n^{ip} + D_V$$

$$\text{Dew point calc} \rightarrow T_{n+1}$$

$$\text{Bilancio}_n = V_{n+1} \cdot H_{V_{n+1}} - L_n \cdot h_n - D_V \cdot h_{D_V} - Q_c$$

Multicomponent

❖ Sezione di arricchimento

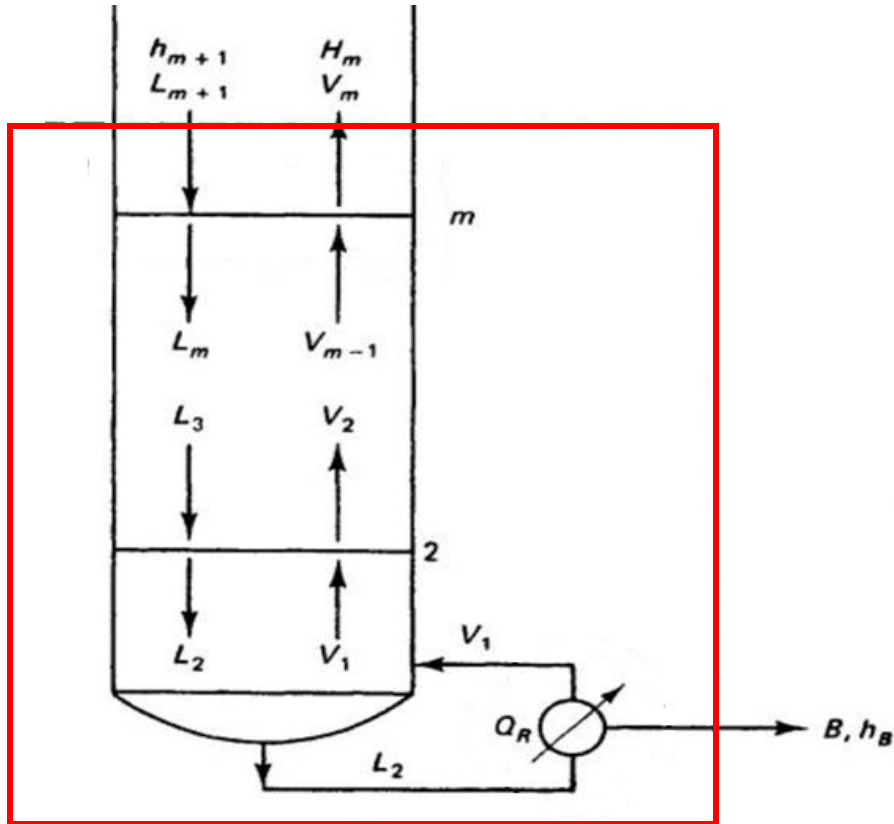


```

while k<3
    rapportoLK_HK(k)=XLmoli(k,LK)/XLmoli(k,HK);
    Lmoli_totmax=2*Lmoli_tot;
    Lmoli_totmin=0;
    for i=1:50
        Lmoli_tot(k)=(Lmoli_totmax+Lmoli_totmin)/2;
        Lmoli(k,:)=XLmoli(k,:)*Lmoli_tot(k);
        Vmoli(k+1,:)=Lmoli(k,:)+Dmoli;
        Vmoli_tot(k+1)=sum(Vmoli(k+1,:));
        YVmoli(k+1,:)=Vmoli(k+1,:)/Vmoli_tot(k+1);
        Tmax=Teb(N);
        Tmin=Teb(1);
        for j=1:50
            T(k+1)=(Tmax+Tmin)/2;
            for i=1:N
                [Po(i)]=PENG_ROBINSON(T(k+1),w(i),Tc(i),Pc(i));
            end
            Kvalue=Po/(P*760);
            XLmoli(k+1,:)=YVmoli(k+1,:)/Kvalue;
            sommatoriaX=sum(XLmoli(k+1,:));
            if sommatoriaX<1
                Tmax=T(k+1);
            else Tmin=T(k+1);
            end
        end
        HVk=sum(Vmoli(k+1,:).*(Hgas+CpmedioG*(T(k+1)-Trif))); %
        HDv=sum(Dmoli.*(Hgas+CpmedioG*(Tcond-Trif))); %portata t
        hL=sum(Lmoli(k,:).*(Hliq+CpmedioL*(T(k)-Trif))); %portata
        Bilancio(k)=HVk-hL-HDV-Qc;
        if Bilancio(k)>0
            Lmoli_totmax=Lmoli_tot(k);
        else Lmoli_totmin=Lmoli_tot(k);
        end
    end
    k=k+1;
    PIATTI_TESTA=k;
end
  
```

Multicomponent

❖ Sezione di arricchimento



$$\text{Se } \text{abs} \left(\frac{y_{LK_m}}{y_{HK_m}} - \frac{X_{LK_F}}{X_{HK_F}} \right) > \text{tolleranza}$$

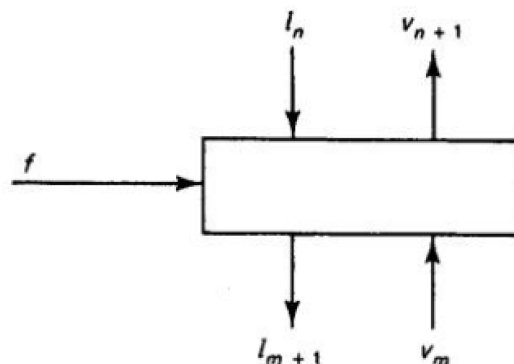
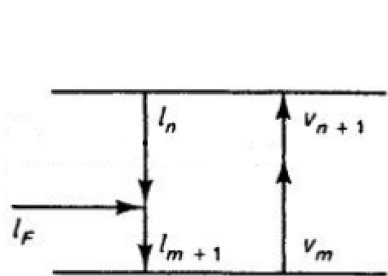
$$V_m^{ip} \rightarrow L_{m+1} = V_m^{ip} + B$$

$$\text{Bubble point calc} \rightarrow T_{m+1}$$

$$\text{Bilancio}_m = L_{m+1} \cdot h_{L_{m+1}} - V_m \cdot H_m - B \cdot h_B + Q_R$$

Multicomponent

❖ Sezione di arricchimento



$$|l_m + l_F - l_{m-1}| \leq \epsilon$$

Criterio di convergenza

$$\alpha = \frac{l_{m+1}}{l_F + l_n}$$

$$d_{z+1} \nearrow = d_z \cdot \alpha \quad \text{se } (d_z \leq B_z \text{ and } d_z \cdot \alpha)$$

$$d_{z+1} \searrow = F - \frac{B_z}{\alpha}$$

```

432 %CRITERIO DI CONVERGENZA
433 - alfa=Lbmoli(PIATTI_CODA+1,:)/(Fmoli+Lmoli(PIATTI_TESTA-1,:));
434
435 - Dmoli_calc=Dmoli.*alfa;
436 - Bmoli_calc=Bmoli./alfa;
437
438 %SE(dk<=bk and dk+1_calc<=f) allora dk+1=dk+1_calc; else dk+1=f-bk+1_calc)
439 - for i=1:N
440 -     if and(Dmoli(i)<=Bmoli(i),Dmoli_calc(i)<=Fmoli(i))
441 -         Dmoli_new(i)=Dmoli_calc(i);
442 -     else
443 -         Dmoli_new(i)=Fmoli(i)-Bmoli_calc(i);
444 -     end
445 - end
446 - DmoliB(z,:)=Dmoli;%serve per tener traccia del vettore D nelle varie iterazioni z
447 - Dmoli=Dmoli_new;
448 - end
    
```