



Figure 14.5: Block diagram for a  $P, T$ -flash calculation.

provide initial estimates of  $\{\gamma_i\}$ ,  $\{\hat{\phi}_i\}$ , and  $V$ . For the dewpoint,  $V = 1$ , with calculated values of  $P_{\text{dew}}$ ,  $\gamma_{i,\text{dew}}$ , and  $\hat{\phi}_{i,\text{dew}}$ ; for the bubblepoint,  $V = 0$ , with calculated values of  $P_{\text{bubl}}$ ,  $\gamma_{i,\text{bubl}}$ , and  $\hat{\phi}_{i,\text{bubl}}$ . The simplest procedure is to interpolate between dewpoint and bubblepoint values in relation to the location of  $P$  between  $P_{\text{dew}}$  and  $P_{\text{bubl}}$ :

$$\frac{\gamma_i - \gamma_{i,\text{dew}}}{\gamma_{i,\text{bubl}} - \gamma_{i,\text{dew}}} = \frac{\hat{\phi}_i - \hat{\phi}_{i,\text{dew}}}{\hat{\phi}_{i,\text{bubl}} - \hat{\phi}_{i,\text{dew}}} = \frac{P - P_{\text{dew}}}{P_{\text{bubl}} - P_{\text{dew}}}$$

and

$$\frac{V - 1}{0 - 1} = \frac{P - P_{\text{dew}}}{P_{\text{bubl}} - P_{\text{dew}}} \quad \text{or} \quad V = \frac{P_{\text{bubl}} - P}{P_{\text{bubl}} - P_{\text{dew}}}$$

With these initial values of the  $\gamma_i$  and  $\hat{\phi}_i$ , initial values of the  $K_i$  can be calculated by Eq. (14.22). The  $P_i^{\text{sat}}$  and  $\hat{\phi}_i^{\text{sat}}$  values are already available from the preliminary  $DEW P$  and  $BUBL P$  calculations. Equations (14.19) and (14.20) now provide starting values of  $F$  and  $dF/dV$  for Newton's method as represented by Eq. (14.21). Repeated application of this equation leads to the value of  $V$  for which Eq. (14.19) is satisfied for the present estimates of  $\{K_i\}$ . The remaining calculations serve to provide new estimates of  $\{\gamma_i\}$  and  $\{\Phi_i\}$  from which