

$$A = \left(\frac{\partial p}{\partial \varrho} \right)_T, \quad B = \left(\frac{\partial p}{\partial T} \right)_\varrho, \quad C = \left(\frac{\partial s}{\partial \varrho} \right)_T, \quad D = \left(\frac{\partial s}{\partial T} \right)_\varrho \quad (1)$$

$$\left(\frac{\partial p}{\partial \varrho} \right)_s = \left(\frac{\partial p}{\partial \varrho} \right)_T - \left(\frac{\partial p}{\partial T} \right)_\varrho \left(\frac{\partial s}{\partial \varrho} \right)_T \bigg/ \left(\frac{\partial s}{\partial T} \right)_\varrho = A - \frac{B \cdot C}{D} \quad (2)$$

$$\left(\frac{\partial^2 p}{\partial \varrho^2} \right)_s = \left(\frac{\partial A}{\partial \varrho} \right)_s - \frac{\left(\frac{\partial B}{\partial \varrho} \right)_s C D + B \left(\frac{\partial C}{\partial \varrho} \right)_s D - B C \left(\frac{\partial D}{\partial \varrho} \right)_s}{D^2} \quad (3)$$

$$= \left(\frac{\partial A}{\partial \varrho} \right)_s - \left(\frac{\partial B}{\partial \varrho} \right)_s \frac{C}{D} - \left(\frac{\partial C}{\partial \varrho} \right)_s \frac{B}{D} + \left(\frac{\partial D}{\partial \varrho} \right)_s \frac{B C}{D^2} \quad (4)$$

$$\left(\frac{\partial A}{\partial \varrho} \right)_s = \left(\frac{\partial^2 p}{\partial \varrho^2} \right)_T - \left(\frac{\partial^2 p}{\partial T \partial \varrho} \right) \left(\frac{\partial s}{\partial \varrho} \right)_T \bigg/ \left(\frac{\partial s}{\partial T} \right)_\varrho \quad (5)$$

$$\left(\frac{\partial B}{\partial \varrho} \right)_s = \left(\frac{\partial^2 p}{\partial T \partial \varrho} \right) - \left(\frac{\partial^2 p}{\partial T^2} \right)_\varrho \left(\frac{\partial s}{\partial \varrho} \right)_T \bigg/ \left(\frac{\partial s}{\partial T} \right)_\varrho \quad (6)$$

$$\left(\frac{\partial C}{\partial \varrho} \right)_s = \left(\frac{\partial^2 s}{\partial \varrho^2} \right)_T - \left(\frac{\partial^2 s}{\partial T \partial \varrho} \right) \left(\frac{\partial s}{\partial \varrho} \right)_T \bigg/ \left(\frac{\partial s}{\partial T} \right)_\varrho \quad (7)$$

$$\left(\frac{\partial D}{\partial \varrho} \right)_s = \left(\frac{\partial^2 s}{\partial T \partial \varrho} \right) - \left(\frac{\partial^2 s}{\partial T^2} \right)_\varrho \left(\frac{\partial s}{\partial \varrho} \right)_T \bigg/ \left(\frac{\partial s}{\partial T} \right)_\varrho \quad (8)$$

$$\begin{aligned} \left(\frac{\partial^2 p}{\partial \varrho^2} \right)_s &= \left(\frac{\partial^2 p}{\partial \varrho^2} \right)_T - \left[\left(\frac{\partial p}{\partial T} \right)_\varrho \left(\frac{\partial^2 s}{\partial \varrho^2} \right)_T + 2 \left(\frac{\partial^2 p}{\partial T \partial \varrho} \right) \left(\frac{\partial s}{\partial \varrho} \right)_T \right] \bigg/ \left(\frac{\partial s}{\partial T} \right)_\varrho \\ &\quad - \left[\left(\frac{\partial^2 p}{\partial T^2} \right)_\varrho \left(\frac{\partial s}{\partial \varrho} \right)_T^2 + 2 \left(\frac{\partial p}{\partial T} \right)_\varrho \left(\frac{\partial s}{\partial \varrho} \right)_T \left(\frac{\partial^2 s}{\partial T \partial \varrho} \right) \right] \bigg/ \left(\frac{\partial s}{\partial T} \right)_\varrho^2 \\ &\quad + \left[\left(\frac{\partial p}{\partial T} \right)_\varrho \left(\frac{\partial s}{\partial \varrho} \right)_T^2 \left(\frac{\partial^2 s}{\partial T^2} \right)_\varrho \right] \bigg/ \left(\frac{\partial s}{\partial T} \right)_\varrho^3 \end{aligned} \quad (9)$$