

279(b) : Linearized Equations of Note 279(5)

The factor $x/(1-x)$ is approximated by :
- (1)
 $1 - x \sim 1$

and $x = \exp\left(-\frac{\hbar\omega}{kT}\right) \sim 1 - \frac{\hbar\omega}{kT}$ - (2)

for $\hbar\omega \ll kT$ - (3)

This result is :

$$\left(1 - \frac{\hbar\omega}{kT}\right)\omega = \left(1 - \frac{\hbar\omega_1}{kT}\right)\omega_1 + \left(1 - \frac{\hbar\omega_2}{kT}\right)\omega_2 \quad - (4)$$

i.e.
 $A\omega = A_1\omega_1 + A_2\omega_2$ - (5)

here $A = 1 - \frac{\hbar\omega}{kT}$ - (6)

$$A_1 = 1 - \frac{\hbar\omega_1}{kT} \quad - (7)$$

$$A_2 = 1 - \frac{\hbar\omega_2}{kT} \quad - (8)$$

and $A_2^2\omega_2^2 = A^2\omega^2 + n_1^2 A_1^2\omega_1^2$ - (6)

$$- 2AA_1 n_1 \omega\omega_1 \cos(\theta - \theta_1)$$

Eqs. (5) and (6) must be solved simultaneously.