We take the boundary conditions of field components at two interfaces as taken for non-radiative case and get the following equations

\[
E_{x1} - (E_{x2} + E_{x2}) = 0
\]

\[
(E_{x2} e^{ik_2d} + E_{x2} e^{-ik_2d}) - E_{x3} e^{-ik_3d} = 0
\]

\[
\frac{\omega \varepsilon_1}{K_1} E_{x1} - \frac{\omega \varepsilon_2}{K_2} (E_{x2} - E_{x2}) = \sigma_{xx} E_{x1}
\]

\[
\frac{\omega \varepsilon_2}{K_2} (E_{x2} e^{ik_2d} - E_{x2} e^{-ik_2d}) - \frac{\omega \varepsilon_3}{K_3} E_{x3} e^{-ik_3d} = 0
\]

...(B.1)

The above four equations consist of four unknown quantities such as \( E_{x1}, E_{x2}, E_{x2}', \) and \( E_{x3} \). The condition for these equations having a unique solution is that the determinant of coefficient must be zero. Thus we have

\[
\begin{bmatrix}
1 & -1 & -1 & 0 \\
0 & e^{ik_2d} & e^{-ik_2d} & -e^{-ik_3d} \\
0 & \frac{\omega \varepsilon_1}{K_1} - \sigma_{xx} & \frac{-\omega \varepsilon_2}{K_2} & \frac{\omega \varepsilon_2}{K_2} & 0 \\
0 & \frac{\omega \varepsilon_2}{K_2} e^{ik_2d} & \frac{-\omega \varepsilon_2}{K_2} e^{-ik_2d} & \frac{-\omega \varepsilon_3}{K_3} e^{-ik_3d} & \frac{\omega \varepsilon_3}{K_3}
\end{bmatrix}
\]

...(B.2)
After little bit of algebra we reach at the equation (6.4) which is the dispersion relation for radiative plasma wave.

Since the angular frequency $\omega$ is a complex quantity we put $\omega = \omega' + i\omega''$ in equation (6.4). Now equating the real and imaginary parts of this equation to zero we get two simultaneous equations as given in equations (6.8) and (6.9).