

em waves in metals

1. Prove (not by substitution) that the real and imaginary parts of the complex wavevector for the attenuated em waves in a metal are given by:

$$k_1 = \omega \sqrt{\frac{\epsilon\mu}{2}} \left[\sqrt{1 + \left(\frac{\sigma}{\epsilon\omega}\right)^2} + 1 \right]^{1/2}$$

$$k_2 = \omega \sqrt{\frac{\epsilon\mu}{2}} \left[\sqrt{1 + \left(\frac{\sigma}{\epsilon\omega}\right)^2} - 1 \right]^{1/2}$$