

One problem (~ Jackson 7.4)

A plane-polarized electromagnetic wave of frequency ω in free space is incident normally on the flat surface of a nonpermeable medium ($\mu = \mu_0$) of conductivity σ and dielectric constant ϵ .

- (a) Calculate the amplitude and phase of the reflected wave relative to the incident wave in terms of σ and ϵ .
- (b) For the limiting case of a very good conductor, show that the reflection coefficient (ratio of reflected to incident intensity) is approximately $R = 1 - 2\delta\omega/c$, where δ is the skin depth. (Remember intensity $\propto E^2$.)