

EG-11
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Fresnel's Formulas : - The formulas relating the amplitude of the reflected and transmitted EMWs with the incident one when the boundary is between two dielectrics are called Fresnel formulas.

These are contained in the following boundary conditions

$$(D_i)_n + (D_R)_n = (D_T)_n \quad \text{--- (1)}$$

$$(B_i)_n + (B_R)_n = (B_T)_n \quad \text{--- (2)}$$

$$(E_i)_t + (E_R)_t = (E_T)_t \quad \text{--- (3)}$$

$$(H_i)_t + (H_R)_t = (H_T)_t \quad \text{--- (4)}$$

The conditions eq. (1) and (2) when coupled with Snell's law yield ~~no~~ information not ~~is~~ included in the conditions of eq. (3) & (4). So, it is necessary to consider only conditions of eq. (3) & (4).

Now, to derive the desired formulas we consider a plane EMW, in $x-z$ plane (plane of incidence) incident on a plane boundary ($x-y$ plane) and consider it as a superposition of two waves one with the electric vector parallel to the plane of incidence and other with electric vector perpendicular to the plane of incidence.

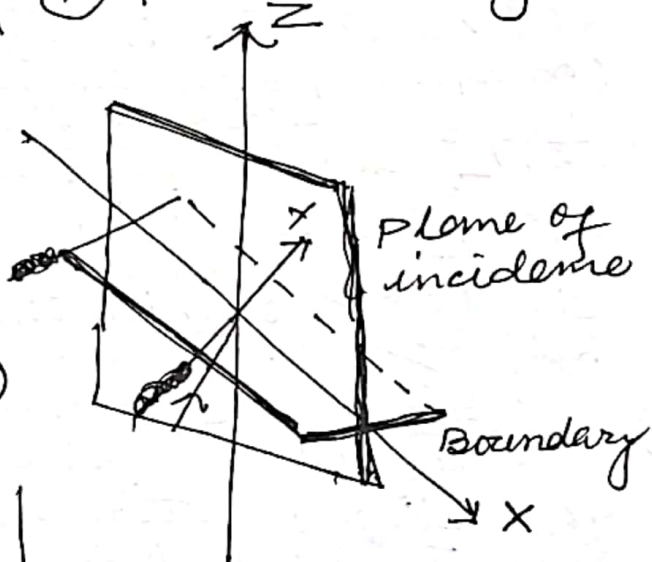


Fig. (1)

Therefore, it is sufficient to consider these two cases separately. These cases will be discussed in next topics.