1 Equivalent theorem understanding in case of plane wave propagation

In case of plane wave propagation, the equivalent theorem is applied for a good understanding.

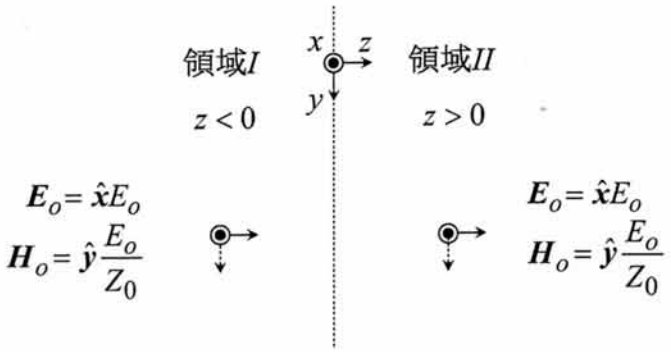

Figure 1: Original model

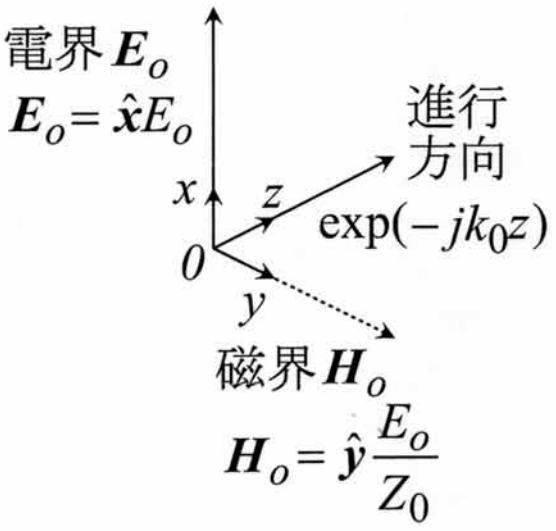

Figure 2: Plane wave

In fig.1, the free space is divided into two regions by an infinite plane at $z = 0$. For $z < 0$ and $z > 0$, the region I and region II are defined, respectively. For $+z$ propagation the plane wave is polarized in $+x$. In fig.2 the electromagnetic wave is shown and expressions are given as :

$$\mathbf{E}_o = \hat{\mathbf{x}} E_0 \exp(-jk_0 z) \tag{1}$$

$$\mathbf{H}_o = \hat{\mathbf{y}} \frac{E_0}{Z_0} \exp(-jk_0 z) \tag{2}$$

k_0 is wave number and Z_0 is impedance in free space.