Unit 3

Aperture Antennas

Horn Antenna

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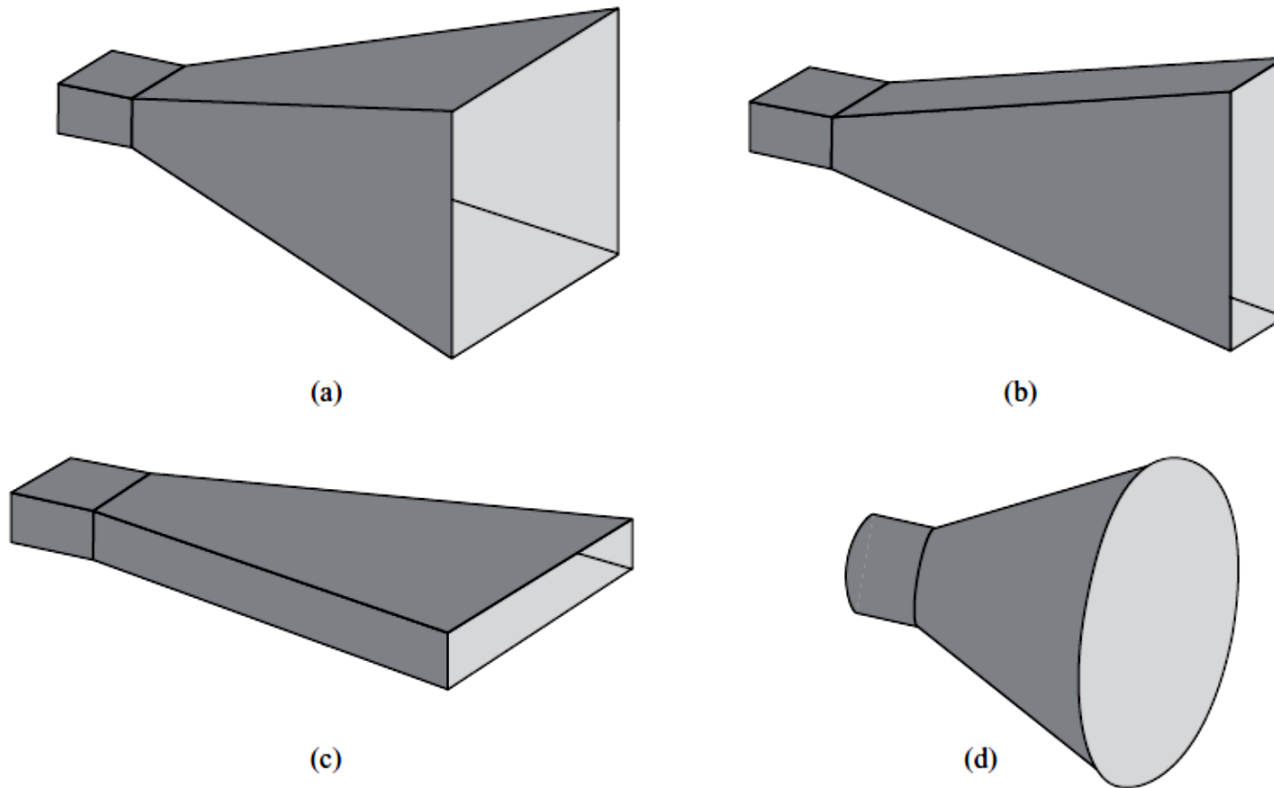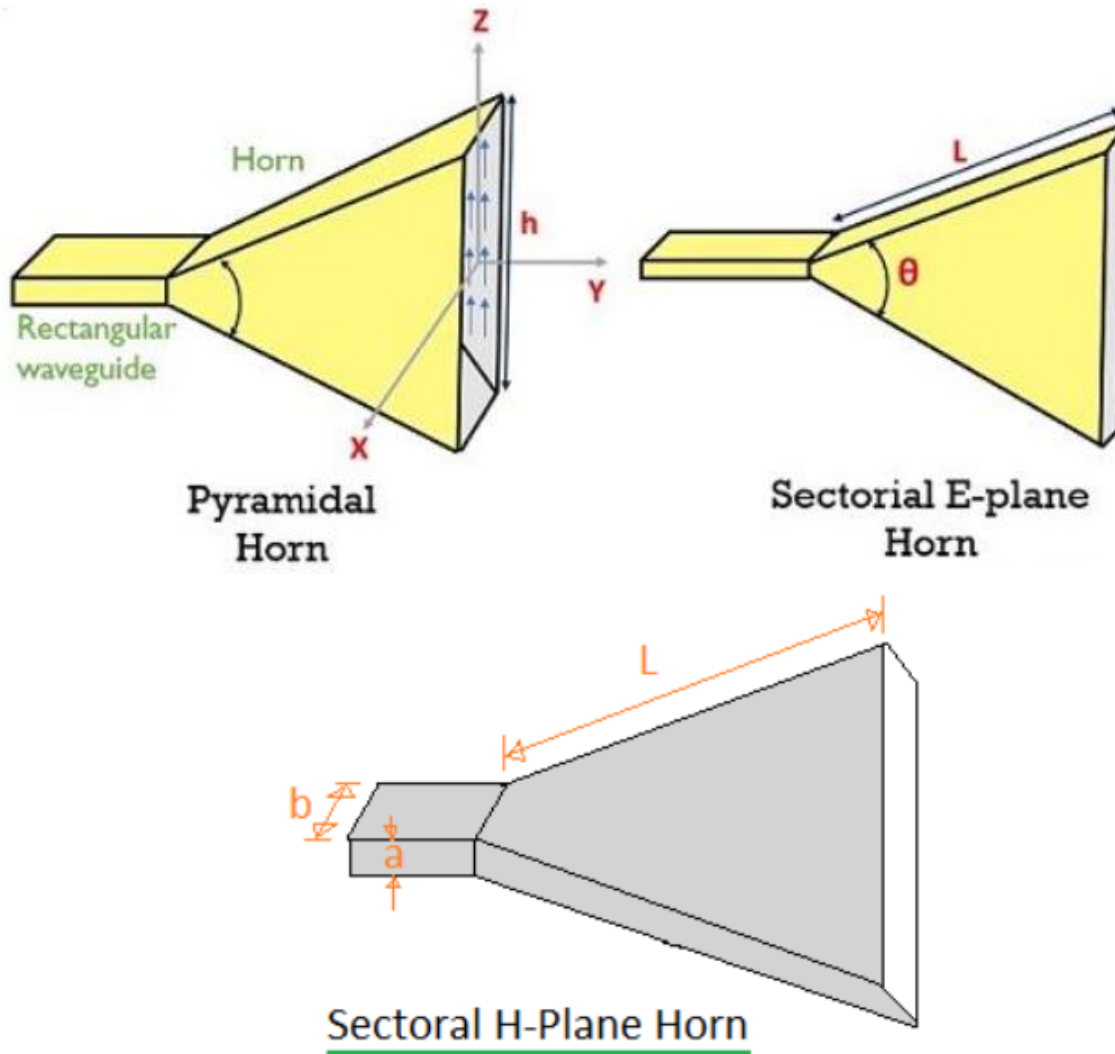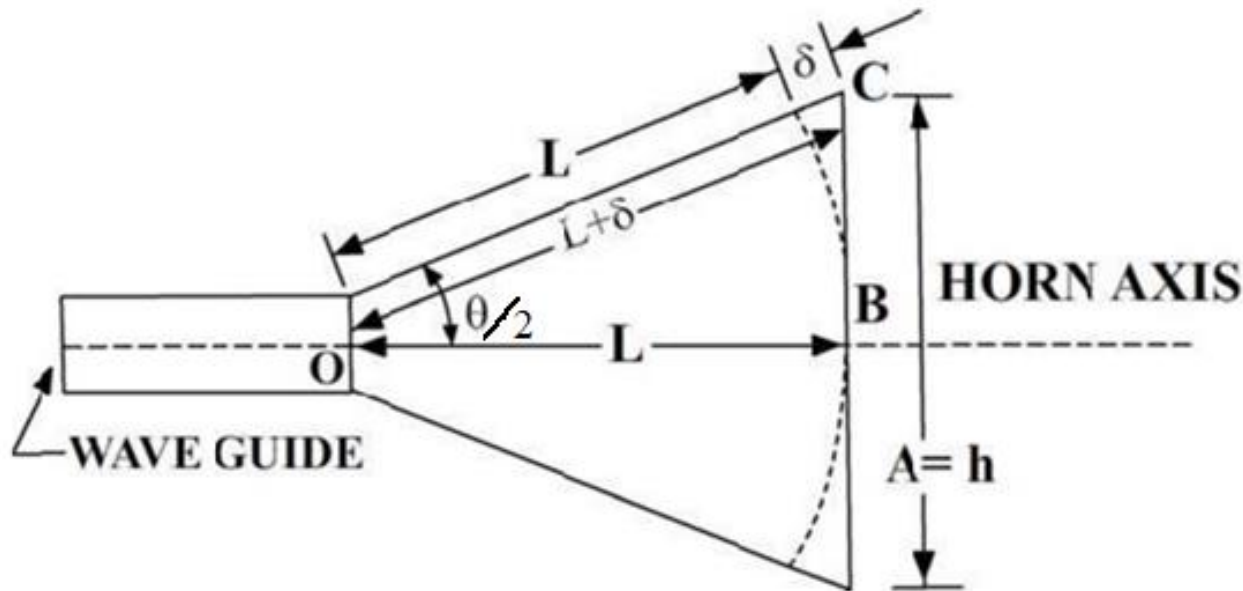

Fig. 4.11 Typical horn antennas—(a) pyramidal horn, (b) **E**-plane horn, (c) **H**-plane horn, and (d) conical horn

Types of Horn

Pyramidal Horn

Sectorial E-plane Horn

Sectoral H-Plane Horn

Pyramidal Horn

The pyramidal horn is obtained by flaring all four sides of a rectangular wave guide to form a pyramid-shaped horn with a rectangular aperture.

Pyramidal horn antenna cross-section.

Design Equations

$$\frac{\theta}{2} = \tan^{-1}\left(\frac{h}{2L}\right) = \cos^{-1}\left(\frac{L}{L+\delta}\right)$$

$$L = \frac{h^2}{8\delta}$$

HPBW in E and H directions are

$$\theta_E = \frac{56\lambda}{h} \text{ deg.} \qquad\qquad \theta_H = \frac{56\lambda}{w} \text{ deg.}$$

The directivity D is given by

$$D = \frac{7.5A}{\lambda^2}$$

Power given by

$$G_P = \frac{4.1A}{\lambda^2}$$

References

1.John D Krauss and Ronald J Marhefka, "Antennas For All Applications", Third Edition, Tata McGraw-Hill, 2006.