

Arrays

$$\vec{E}_{dipolo} = j \eta \frac{e^{-jkr}}{2\pi r} I \frac{\cos(\frac{\pi}{2} \cos(\theta))}{\sin \theta} \hat{\theta}, \; \eta = 120\pi$$

$$Z_{dip}^{\lambda/2} = 73 + j42 \; \Omega$$

$$|FA(\psi)| = \left|\frac{\sin(N\frac{\psi}{2})}{\sin(\frac{\psi}{2})}\right|$$

$$D_{max} = \frac{S_{max}}{P_{rad}/4\pi r^2} = \frac{120}{R_{in-dip}^{tot}} N_{dip}^2$$

$$D_{boraside} \simeq 2N \frac{d}{\lambda}$$

$$D_{endfire} \simeq 4N \frac{d}{\lambda}$$

$$\text{Margen visible: } [-kd+\alpha, \; kd+\alpha]$$

$$\left\{ \begin{array}{l} k_x = k \sin(\theta) \cos(\varphi) \\ k_y = k \sin(\theta) \sin(\varphi) \\ k_z = k \cos(\theta) \end{array} \right.$$

$$\text{Distancia entre nulos: } \frac{2\pi}{N}, \frac{4\pi}{N}, \dots, 2\pi$$

$$NLPS = 20 \log_{10} \left(\frac{N}{|FA(\frac{3\pi}{2N})|} \right) = 20 \log_{10} \left(N \sin \left(\frac{3\pi}{2N} \right) \right) dB$$

$$RDA = 20 \log_{10} \left(\frac{|FA(0)|}{|FA(-2kd)|} \right) dB$$

$$\text{Acoplamientos mutuos: } \left\{ \begin{array}{l} V_i = Z_{i1}I_1 + Z_{i2}I_2 + \cdots + Z_{ij}I_j \\ Z_i = \frac{V_i}{I_i} = Z_{i1}\frac{I_1}{I_i} + Z_{i2}\frac{I_2}{I_i} + \cdots + Z_{ij}\frac{I_j}{I_i} \end{array} \right.$$

Bocinas

$$\vec{E}_{apertura} = E_0 \cos\left(\frac{\pi}{a_g}x\right) \hat{y}$$

$$s = \frac{b^2}{8\lambda L_E}, \; s_{opt} = \frac{1}{4}$$

$$t = \frac{a^2}{8\lambda L_H}, \; t_{opt} = \frac{3}{8}$$

$$\text{Error de fase: } \left\{ \begin{array}{l} 2\pi s \\ 2\pi t \end{array} \right.$$

$$b_{opt} = \sqrt{2\lambda L_E}$$

$$a_{opt} = \sqrt{3\lambda L_H}$$

$$D_{pir} = \frac{4\pi}{\lambda^2} A_{eff} = \frac{4\pi}{\lambda^2} A_{geom} \, \eta_{il} = \frac{4\pi}{\lambda^2} a \, b \, \eta_{il_x} \, \eta_{il_y}$$

$$\eta_{il, \, pir}^{opt} \simeq 0.5188$$

$$\eta_{il, \, H}^{opt} = \eta_{il, \, E}^{opt} \simeq 0.6485$$

Reflectores

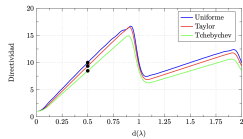
$$R = f + (f - R \cos(\alpha)) \Rightarrow R = \frac{2f}{1+\cos(\alpha)} = \frac{f}{\cos^2(\frac{\alpha}{2})}$$

$$\rho = R \sin(\alpha) = 2f \tan\left(\frac{\alpha}{2}\right)$$

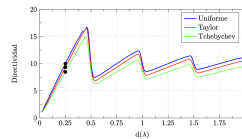
$$\tau_c = 40 \log_{10} \left(\cos \left(\frac{\beta}{2} \right) \right) dB$$

$$\frac{f}{D} = \frac{1}{4 \tan \left(\frac{\beta}{2} \right)}$$

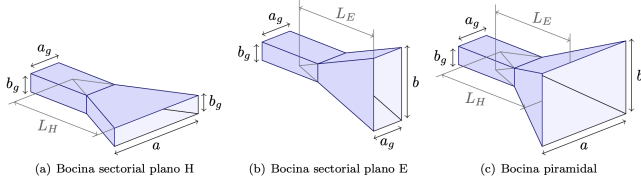
Broadside



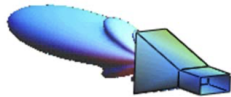
Endfire



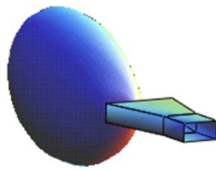
Bocinas



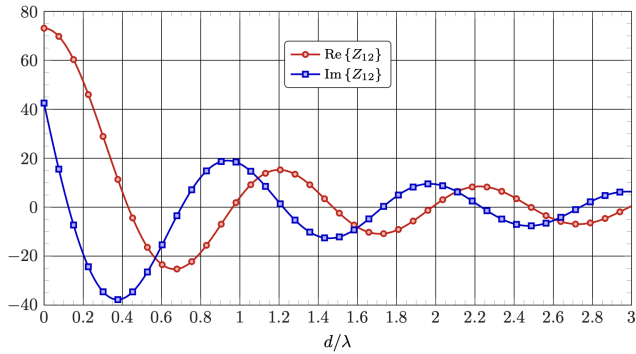
Plano E



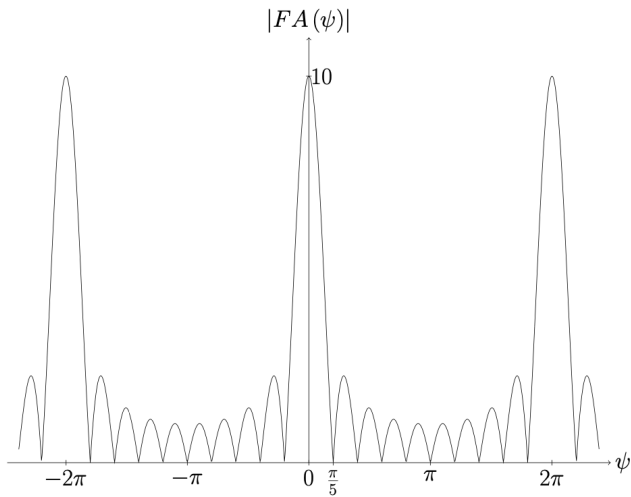
Plano H



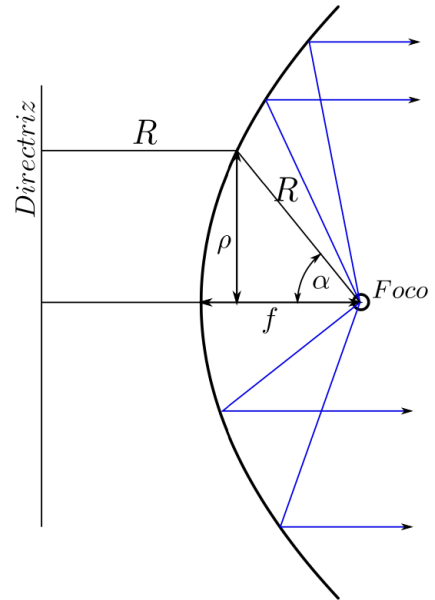
z_{12} de dipolos paralelos de $H = \lambda/4$



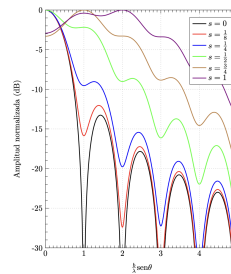
Factor de array para $N = 10$



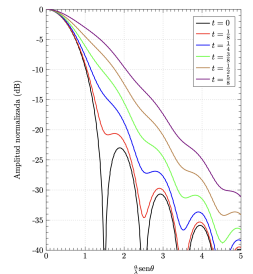
Reflector Parabolico



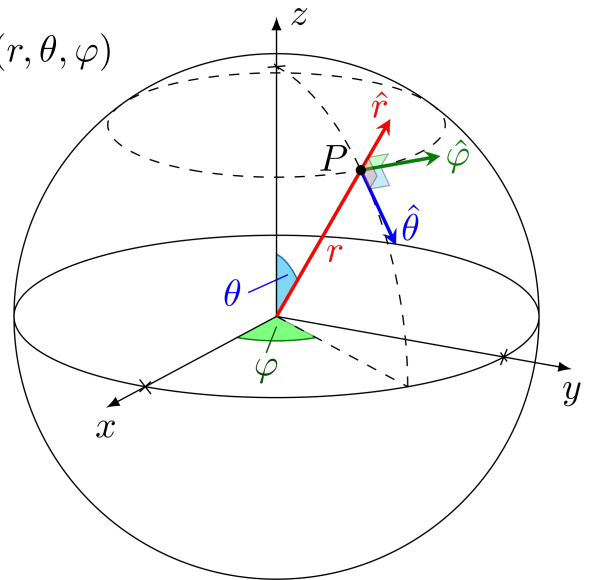
Reflector plano E



Reflector plano H



$P(r, \theta, \varphi)$



$$\begin{aligned} x &= r \sin(\theta) \cos(\varphi) \\ y &= r \sin(\theta) \sin(\varphi) \\ z &= r \cos(\theta) \end{aligned}$$