

Problem 2.4.1

(a) $N=21$, $d=\lambda/2$. To steer to θ_T : $w(\theta_T) = \frac{1}{N} v(\theta_T)$

$$B_\theta(\theta) = w(\theta_T)^H v(\theta)$$

- see plots

(b) The HPBW is given by (2.136) for angles from 90° down to the scan limit where $\theta_L = 0$.

This occurs at

$$\theta_T = \cos^{-1} \left[\cos(\theta_L=0) - 0.450 \frac{\lambda}{Nd} \right]$$

$$= \cos^{-1} \left[1 - 0.450 \frac{2}{21} \right] = \underline{\underline{16.8^\circ \text{ for our problem}}}$$

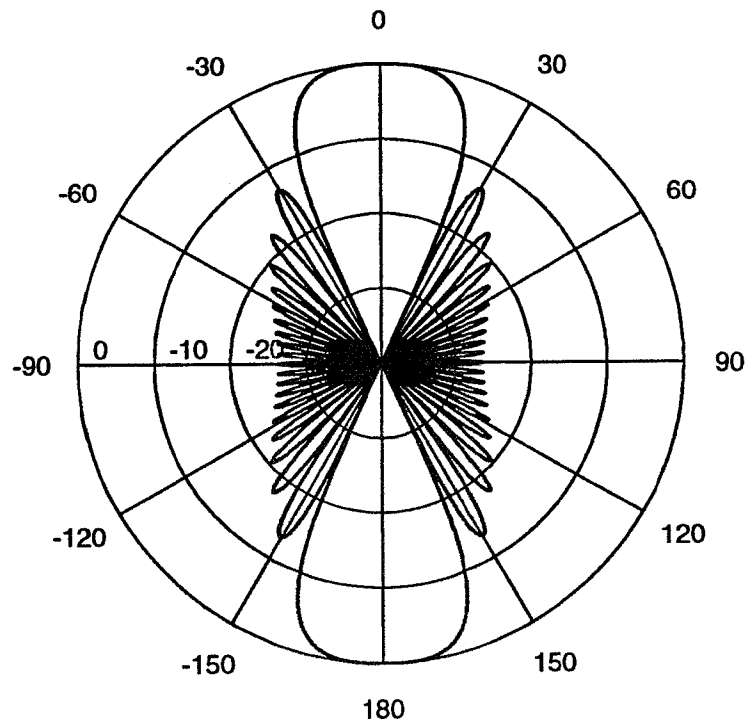
Then there is no HPBW until we reach endfire $\theta_T=0$, where the HPBW is given by (2.138).

for our steering angles, we have

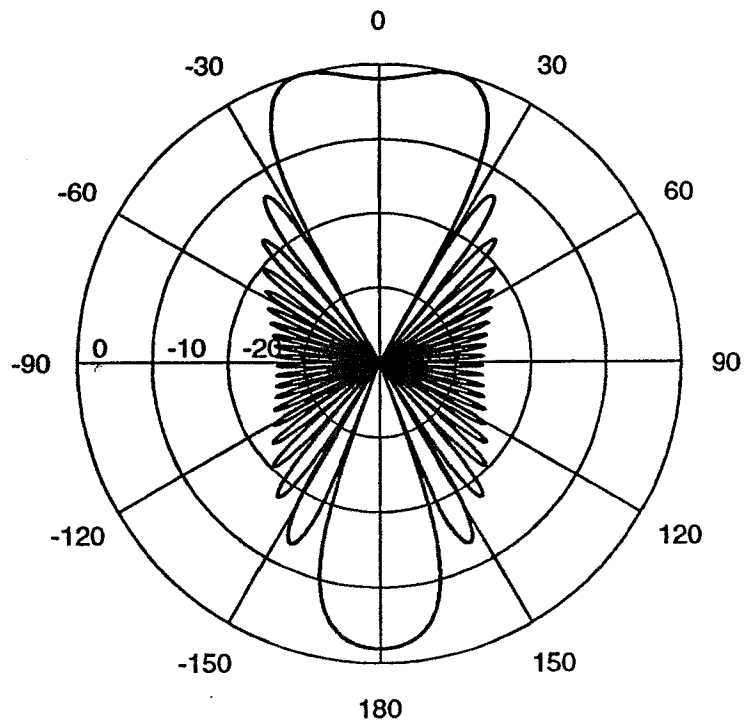
θ_T	θ_H
0°	33.6700°
15°	not defined (not defined for $0 < \theta_T < 16.8^\circ$)
30°	9.9482°
60°	5.6755°
90°	4.9126°

Problem 2.4.1, $N = 21$, $\theta_T = 0$ (deg)

2.4.1 (2)

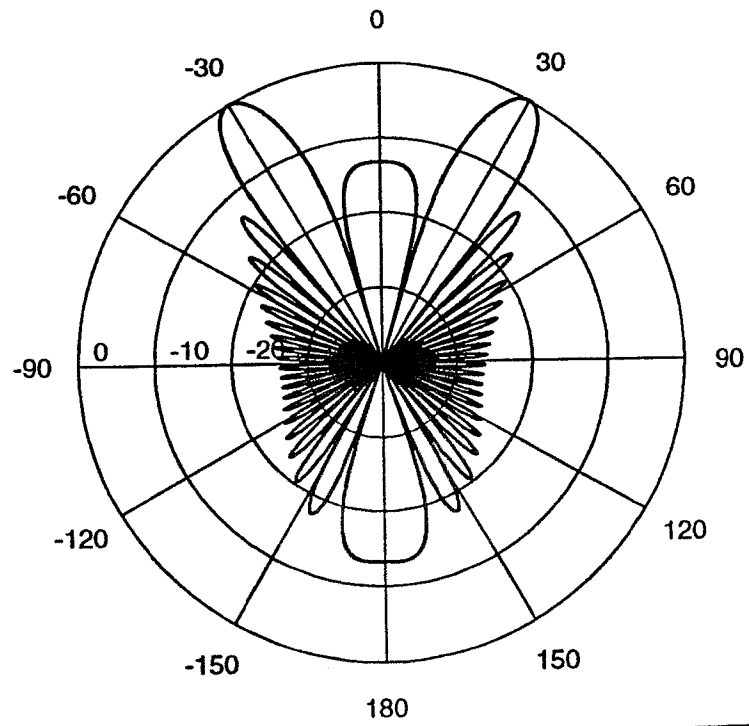


Problem 2.4.1, $N = 21$, $\theta_T = 15$ (deg)

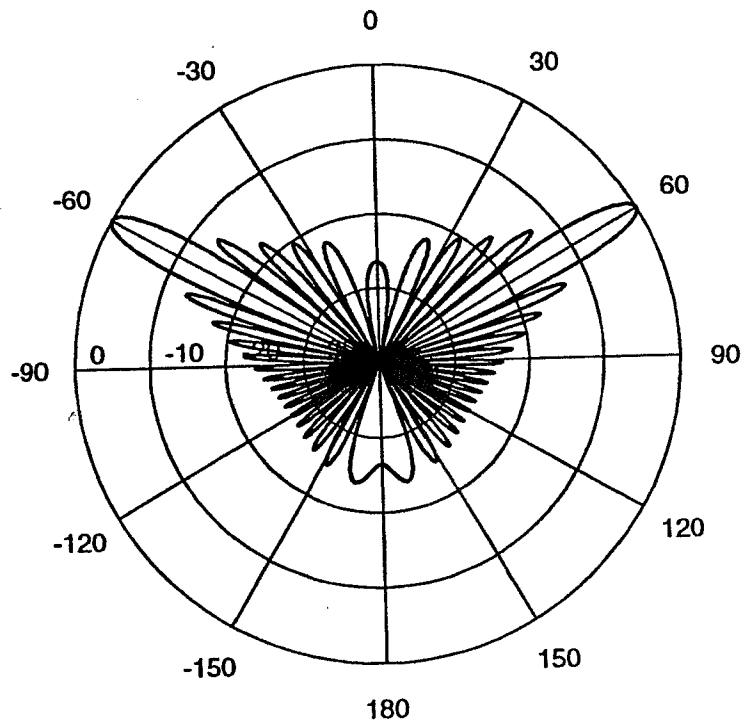


Problem 2.4.1, $N = 21$, $\theta_T = 30$ (deg)

2.4.1 (3)



Problem 2.4.1, $N = 21$, $\theta_T = 60$ (deg)



2.4.1 ④

Problem 2.4.1, $N = 21$, $\theta_T = 90$ (deg)

