

9.12 The radiation pattern of a circular parabolic-reflector antenna consists of a circular major lobe with a half-power beamwidth of 2° and a few minor lobes. Ignoring the minor lobes, obtain an estimate for the antenna directivity in dB.

Solution: A circular lobe means that $\beta_{xz} = \beta_{yz} = 2^\circ = 0.035$ rad. Using Eq. (9.26), we have

$$D = \frac{4\pi}{\beta_{xz}\beta_{yz}} = \frac{4\pi}{(0.035)^2} = 10.26 \times 10^3.$$

In dB,

$$D(\text{dB}) = 10\log D = 10\log(10.26 \times 10^3) = 40.11 \text{ dB}.$$
