The relationship $\varphi(\alpha)$ is used to derive a function for the horizon antenna gain (dBi), $G(\varphi)$ as a function of the azimuth α, by using the actual earth station antenna pattern, or a formula giving a good approximation. For example, in cases where the ratio between the antenna diameter and the wavelength is equal to or greater than 35, the following equation is used:

$$G(\varphi) = \begin{cases} G_{amax} - 2.5 \times 10^{-3} \left(\dfrac{D}{\lambda} \varphi \right)^2 & \text{for } 0 < \varphi < \varphi_m \\ G_1 & \text{for } \varphi_m \le \varphi < \varphi_r \\ 29 - 25 \log \varphi & \text{for } \varphi_r \le \varphi < 36° \\ -10 & \text{for } 36° \le \varphi \le 180° \end{cases} \tag{97}$$

$$G_1 = \begin{cases} -1 + 15 \log (D/\lambda) \quad \text{dBi} & \text{for} \quad D/\lambda \ge 100 \\ -21 + 25 \log (D/\lambda) \quad \text{dBi} & \text{for} \quad 35 \le D/\lambda < 100 \end{cases}$$

$$\varphi_m = \frac{20\,\lambda}{D} \sqrt{G_{amax} - G_1} \qquad \text{degrees}$$

$$\varphi_r = \begin{cases} 15.85 \, (D/\lambda)^{-0.6} \quad \text{degrees} & \text{for} \quad D/\lambda \ge 100 \\ 100 \, (\lambda/D) \quad \text{degrees} & \text{for} \quad 35 \le D/\lambda < 100 \end{cases}$$

Where a better representation of the actual antenna pattern is available, it may be used.

In cases where D/λ is not given, it may be estimated from the expression:

$$20 \log \frac{D}{\lambda} \approx G_{amax} - 7.7$$

where:

G_{amax}: main beam axis antenna gain (dBi)

D: antenna diameter (m)

λ: wavelength (m)

G_1: gain of the first side lobe (dBi).