Name: APERR_007V01

Type: Earth station, Receiving

Region(s): 13

Description:

Appendix 30 reference receiving earth station antenna pattern for Regions 1 and 3 (WRC-97). Frequency is fixed to 12.1 GHz.

Required Input Parameters:

gain,ant_diam

Validation Warnings/Errors:

Type	Message
Error	Gmax () is less than G1 (). Square root of negative value.
Error	Phir () is less than Phim ().
Error	Phi2 () is less than Phi1 ().
Error	0 () is less than S ().
Warning	Phir () is less than Phim ().

Pattern Information:

Used at WRC-97 for revising the Regions 1 and 3 BSS Plan.

The Plan was based on a 60 cm antenna given in Recommendation ITU-R BO.1213. Antenna maximum gain was 35.5 dBi and the reference frequency was 12.1 GHz. The minimum antenna diameter was such that the half-power beamwidth was 2.86 degrees.

The pattern requires input parameter antenna diameter.

Co-Polar Component:

$G = G_{max} - 2.5 \times 10^{-3} (D/\lambda\ \varphi)^2$ for $0° \le \varphi < \varphi_m$

$G = G_1$ for $\varphi_m \le \varphi < \varphi_r$

$G = 29 - 25 \log \varphi$ for $\varphi_r \le \varphi < \varphi_b$

$G = -5$ for $\varphi_b \le \varphi < 70°$

$G = 0$ for $70° \le \varphi \le 180°$

where:

λ is the wavelength corresponding to fixed reference frequency of 12.1 GHz.

$\varphi_m = 20\ \lambda/D \sqrt{G_{max} - G_1}$.

$\varphi_r = 95\ \lambda/D$.

$G_1 = 29 - 25 \log \varphi_r$.

$\varphi_b = 10^{\left(\frac{34}{25}\right)}$.

Cross-Polar Component:

$G_x = G_{max} - 25$ for $0° \le \varphi < 0.25\ \varphi_0$

$G_x = G_{max} - 25 + 8 \left(\frac{\varphi - 0.25\varphi_0}{0.19\varphi_0} \right)$ for $0.25\ \varphi_0 \le \varphi < 0.44\ \varphi_0$

$G_x = G_{max} - 17$ for $0.44\ \varphi_0 \le \varphi < \varphi_0$

$G_x = G_{max} - 17 + S \left| \frac{\varphi - \varphi_0}{\varphi_1 - \varphi_0} \right|$ for $\varphi_0 \le \varphi < \varphi_1$

$G_x = 21 - 25 \log \varphi$ for $\varphi_1 \le \varphi < \varphi_2$

$G_x = -5$ for $\varphi_2 \le \varphi < 70°$

$G_x = 0$ for $70° \le \varphi \le 180°$

where:

$S = 21 - 25 \log \varphi_1 - (G_{max} - 17)$

$\varphi_0 = 2\ \lambda/D \sqrt{\frac{3}{0.0025}}$.

$\varphi_1 = \frac{\varphi_0}{2} \sqrt{10.1875}$.

$\varphi_2 = 10^{\left(\frac{26}{25}\right)}$.