Name: APELUX201V01

Type: Earth station, Transmitting

Description:

Transmitting earth station antenna pattern submitted by LUX for analyses under Appendix 30A.

Required Input Parameters:

gain

Validation Warnings/Errors:

Type	Message
Error	Co-polar curve () is less than cross-polar curve (). (at plateau level) Gmax is too big.
Warning	Phir () is less than Phim ().
Error	Phi b () is less than Phi x ().

Pattern Information:

As submitted by the administration, there are two antenna types, DBL-TYP1, with a diameter of 5 meters, and DBL-TYP2, with a diameter of 2.5 meters.

In implementing the formulas, the patterns were based on the maximum gain, rather than diameter, so that the same formulas are used for both, with the calculated values being determined by the maximum gain.

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 $\varphi_r \le \varphi < \varphi_b$

$G = -10$ for $\varphi_b \le \varphi \le 180°$

where:

$D/\lambda = \sqrt{\frac{10^{\left(\frac{G_{max}}{10}\right)}}{\eta\pi^2}}$, where η is the efficiency of 0.61.

$\varphi_r = 15.85\ (D/\lambda)^{-0.6}$.

$G_1 = 29 - 25 \log \varphi_r = -1 + 15 \log (D/\lambda)$.

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

$\varphi_b = 10^{\left(\frac{39}{25}\right)}$.

Cross-Polar Component:

$G_x = G_{max} - 30$ for $0° \le \varphi < \varphi_x$

$G_x = 29 - 25 \log \varphi$ for $\varphi_x \le \varphi < \varphi_b$

$G_x = -10$ for $\varphi_b \le \varphi \le 180°$

where:

$\varphi_x = 10^{\left(\frac{59 - G_{max}}{25}\right)}$.

$\varphi_b = 10^{\left(\frac{39}{25}\right)}$.