Name: APEREC023V01

Type: Earth station, Transmitting

Region(s): 123

Required Input Parameters:

gain,dgso

Description:

Recommendation ITU-R S.1855 alternative reference radiation pattern for TRANSMITTING GSO earth station antennas for use in coordination and/or interference assessment in the frequency range from 2 to 31 GHz.

Validation Warnings/Errors:

Type	Message
Error	D/lambda () is less than 15 ().
Error	D_gso () is less than D_equiv ().
Error	Freq () is out of limits [2GHz:31GHz].

Pattern Information:

Note 7 of the recommendation is not applied.
The pattern requires input parameter dgso.
BR software sets antenna efficiency to 0.7 for technical examination.

Co-Polar Component:

If $\varphi_m < \varphi_r$:

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

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

$G = \min(G_1, 29 + 3\sin^2\theta - 25 \log \varphi)$ for $\varphi_r < \varphi < \varphi_{min}$

If $\varphi_m \ge \varphi_r$:

$G = G_{max} - 2.5 \times 10^{-3} ((D/\lambda)_{theta}\, \varphi)^2$ for $0° \le \varphi < \varphi_1$

$G = \max(G_{max} - 2.5 \times 10^{-3} ((D/\lambda)_{theta}\, \varphi)^2, 29 + 3\sin^2\theta - 25 \log \varphi)$ for $\varphi_1 \le \varphi < \varphi_{min}$

$G = 29 + 3\sin^2\theta - 25 \log \varphi$ for $\varphi_{min} \le \varphi \le 7°$

$G = 7.9 + 3(\sin^2\theta)\left(\frac{9.2 - \varphi}{2.2}\right)$ for $7° < \varphi \le 9.2°$

$G = 32 - 25 \log \varphi$ for $9.2° < \varphi \le \varphi_b$

If $(D/\lambda)_{eq} \ge 46.8$:

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

If $15 \le (D/\lambda)_{eq} < 46.8$:

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

$G = 0$ for $70° < \varphi \le 180°$

where:

$(D/\lambda)_{eq} = \sqrt{\frac{10^{\left(\frac{G_{max}}{10}\right)}}{\eta\pi^2}}$. $(D/\lambda)_{theta} = \frac{\frac{1}{\lambda}\frac{D_{GSO}}{K}}{\sqrt{\sin^2\theta + \left(\frac{1}{K}\right)^2 \cos^2\theta}}$.

$K = \left(\frac{D_{GSO}}{D_{eq}}\right)^2$. $\varphi_r = 15.85\, (D/\lambda)_{theta}^{-0.6}$. $\varphi_1 = 0.9 * 114\, (D/\lambda)_{theta}^{-1.09}$.

$\varphi_{min} = \max(\varphi_r, 118\, (D/\lambda)_{theta}^{-1.06})$.

$G_1 = 29 - 25 \log \varphi_r + 3\sin^2\theta$. $\varphi_m = 20\, (\lambda/D)_{theta} \sqrt{G_{max} - G_1}$.

$\varphi_b = 10^{\left(\frac{42}{25}\right)}$ for $(D/\lambda)_{eq} \ge 46.8$, $10^{\left(\frac{37}{25}\right)}$ for $(D/\lambda)_{eq} < 46.8$.