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TO: Holographers

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SUBJECT: Radome loss

Excessive radome loss could account for some of the differences between the rms surface roughness loss measured by holography and that inferred from radiometry. In the table below I have computed the following as a function of frequency and loss tangent:

1] Loss dB

Radome panel loss (average of V and H pol.) - reflective plus resistive at an angle of incidence of 23° or that of a ray at 30 ft radius on the antenna.

2] Phase

Phase advance of ray produced by the presence of the panel.

3] Equivalent rms

The equivalent rms of the resistive loss which increases with loss tangent.

4] Emission

The added radiometric temperature which will result from the resistive loss.

5] A rough estimate of the added temperature from the radome panel reflections using the approximate method of Meeks and Ruze (IEEE Ap 19, Nov 71).

Parameters assumed:

Dielectric	2.85
Thickness	26.5 mils

Comments

Measurements of the radiometric temperature in the radome on good days (with known atmospheric loss) should provide a check on radome loss.

Recent measurements by ESCO in which only the phase shift was accurately measured are consistent with a loss tangent as large as 0.1.

REQ GHZ	LOSS TAN	LOSS DB	PHASE	EQUIV. RMS	EMISSION	REFL
16.000	0.000	-0.168	-12.028	0.061	0.000	2.357
16.000	0.050	-0.262	-11.974	8.755	6.387	2.307
16.000	0.100	-0.355	-11.921	12.376	12.626	2.263
16.000	0.150	-0.448	-11.870	15.151	18.723	2.222
16.000	0.200	-0.541	-11.819	17.487	24.680	2.185
22.000	0.000	-0.300	-16.200	0.045	0.000	4.122
22.000	0.050	-0.425	-16.108	7.355	8.492	4.007
22.000	0.100	-0.549	-16.019	10.398	16.730	3.902
22.000	0.150	-0.674	-15.932	12.729	24.723	3.805
22.000	0.200	-0.798	-15.848	14.693	32.478	3.716
43.000	0.000	-0.840	-28.505	0.025	0.000	10.506
43.000	0.050	-1.055	-28.336	4.945	14.509	10.014
43.000	0.100	-1.271	-28.176	6.999	28.365	9.563
43.000	0.150	-1.488	-28.023	8.579	41.591	9.148
43.000	0.200	-1.706	-27.878	9.915	54.212	8.766
86.000	0.000	-0.980	-47.591	0.013	0.000	12.011
86.000	0.050	-1.398	-47.845	3.447	27.558	10.965
86.000	0.100	-1.821	-48.077	4.886	52.811	10.066
86.000	0.150	-2.247	-48.287	5.997	75.907	9.291
86.000	0.200	-2.676	-48.478	6.939	96.995	8.624
115.000	0.000	-0.273	-63.977	0.009	0.000	3.772
115.000	0.050	-0.927	-64.416	3.221	41.905	3.313
115.000	0.100	-1.575	-64.794	4.546	77.679	3.043
115.000	0.150	-2.218	-65.119	5.557	108.286	2.903
115.000	0.200	-2.857	-65.400	6.405	134.522	2.850