

EM Propagation in Biological Media_Results

1.

$$\Gamma = \frac{\sqrt{\epsilon_{r1}} - \sqrt{\epsilon_{r2}}}{\sqrt{\epsilon_{r1}} + \sqrt{\epsilon_{r2}}}$$

2. $\Gamma = -0.7235$, $\tau = 0.69$, $T_E = 0.2765$

3. 55.3 V/m

4.

f	Γ	T_E
10 MHz	-0.900	0.099
433 MHz	-0.743	0.257
0.9 GHz	-0.731	0.269
1.8 GHz	-0.723	0.276
2.45 GHz	-0.721	0.279
5 GHz	-0.713	0.286
17 GHz	-0.664	0.336

5. 2.8 cm

6.

f	$1/\alpha$ (cm)
10 MHz	57
433 MHz	5.3
0.9 GHz	4.0
1.8 GHz	2.8

2.45 GHz	2.3
5 GHz	1.0
10 GHz	0.37
17 GHz	0.17

7.

tissue	915 MHz	2.45GHz	10 GHz
skin	0.41	0.29	0.47
fat	0.19	0.18	0.35
muscle	0.34	0.24	0.44

8. Find the reflection coefficients of the skin-fat and fat-muscle interfaces at the specified frequencies of problem 7.

f		Γ	T_E
915 MHz	air-skin	-0.73	0.27
	skin-fat	0.31	1.31
	fat-muscle	-0.37	0.63
2.45 GHz	air-skin	-0.72	0.28
	skin-fat	0.30	1.30
	fat-muscle	-0.38	0.62
10 GHz	air-skin	-0.69	0.30
	skin-fat	0.30	1.30
	fat-muscle	-0.38	0.62

9. Skin

10. $E_{\max}(1.8 \text{ GHz})=38.69 \text{ V/m}$, $E_{\max}(17 \text{ GHz})=0.19 \text{ V/m}$

11. Skin

12. 8.43 V/m

Dosimetry_Results

1. 0.41 W/kg
2. 10 MHz, $8.62 \cdot 10^{-3}$ W/kg
5 GHz, 1.14 W/kg
3. 1.8 GHz, 0.3 W/kg
5 GHz, 0.65 W/kg