

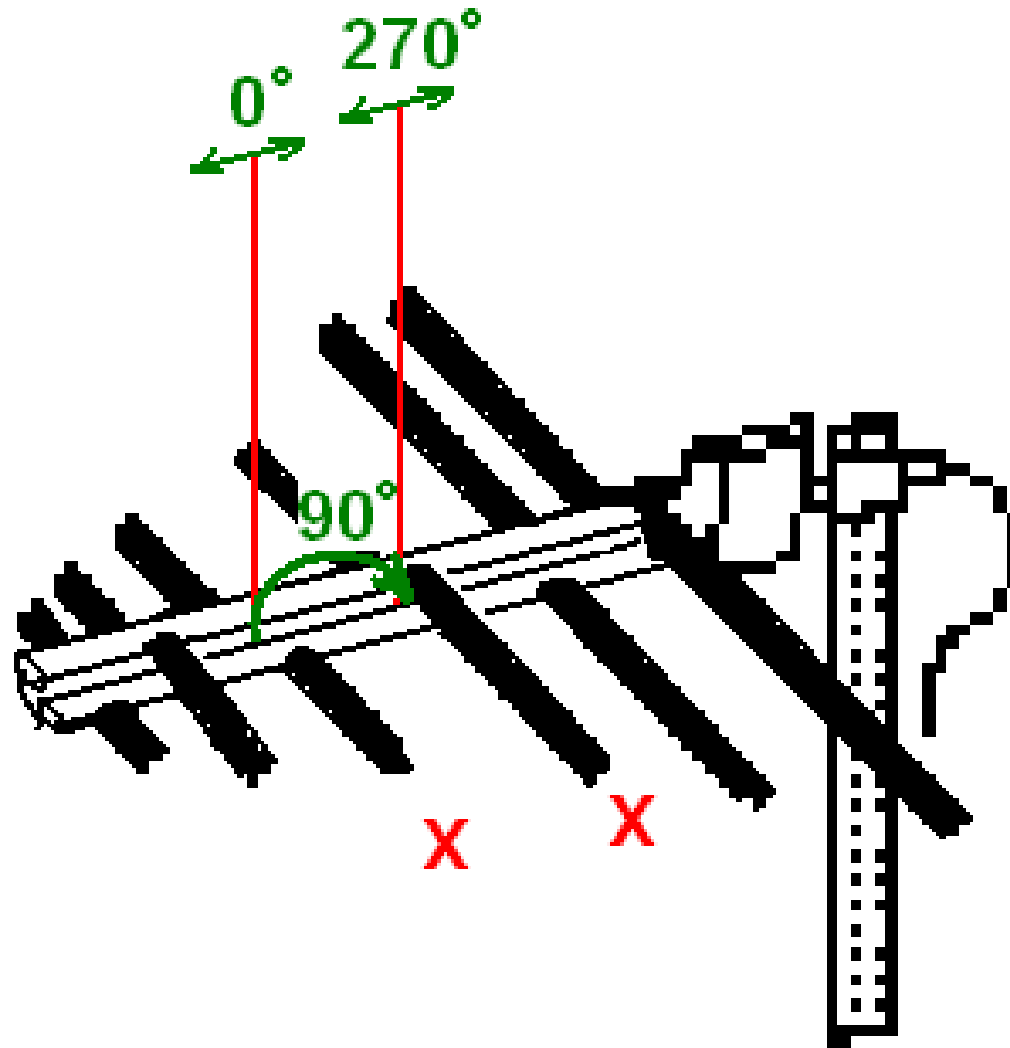
A.R.I.

Sezione di Parma

Discussione estiva su alcuni problemi di antenne:
log-periodic, EH antenna, ecc...

Venerdi, 4 ottobre 2013, ore 21 - Carlo, I4VIL

LOG-PERIODIC ANTENNA



VSWR (ROS) oppure Return Loss ?

Reflection Coefficient: $\Gamma = \frac{Z_L - Z_0}{Z_L + Z_0} = \frac{V_r}{V_d}$

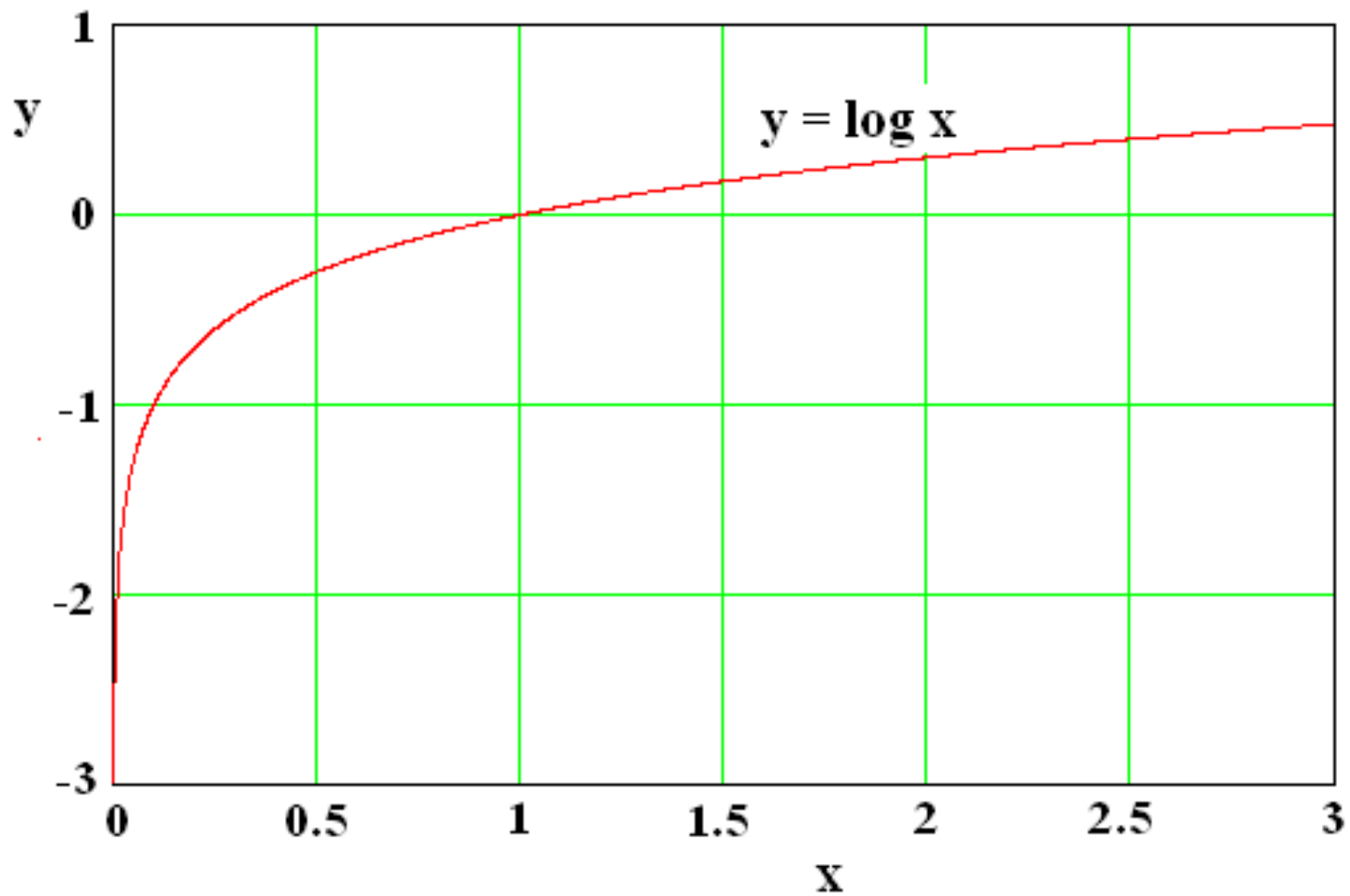
$$VSWR = \frac{1 + |\Gamma|}{1 - |\Gamma|} = \frac{V_{\text{Max}}}{V_{\text{min}}}$$

$$\text{Reflected Power (\%)} = \frac{P_r}{P_d} * 100$$

$$\frac{P_r}{P_d} = |\Gamma|^2 = \left(\frac{VSWR - 1}{VSWR + 1} \right)^2$$

Return Loss: $RL = -10 \cdot \log |\Gamma|^2$

Funzione logaritmica



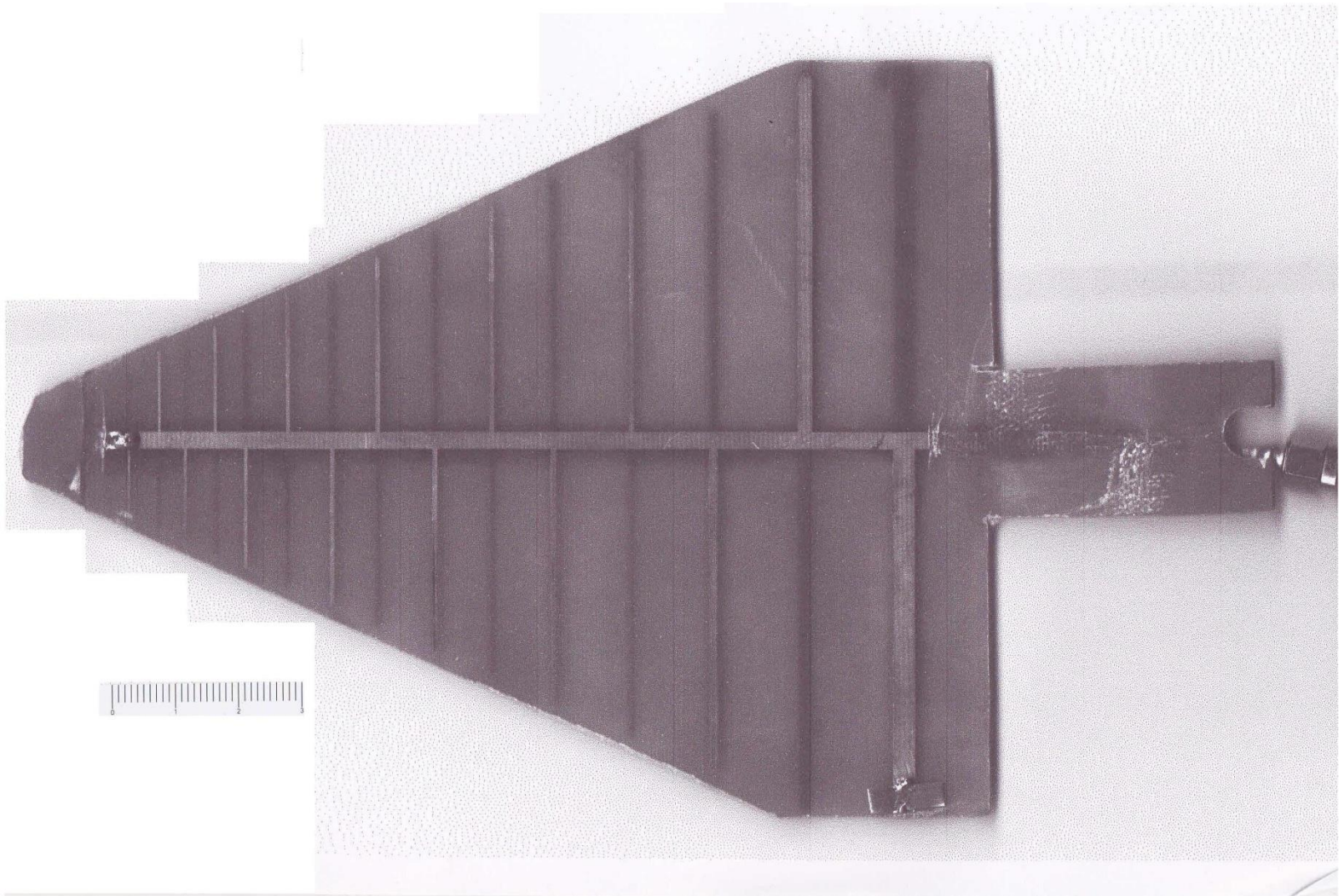
VSWR (ROS) oppure Return Loss ?

$\frac{P_r}{P_d}$	ROS	RL
0.9	37.974	0.458
0.85	24.626	0.706
0.8	17.944	0.969
0.75	13.928	1.249
0.7	11.244	1.549
0.65	9.321	1.871
0.6	7.873	2.218
0.55	6.741	2.596
0.5	5.828	3.01
0.45	5.076	3.468
0.4	4.442	3.979

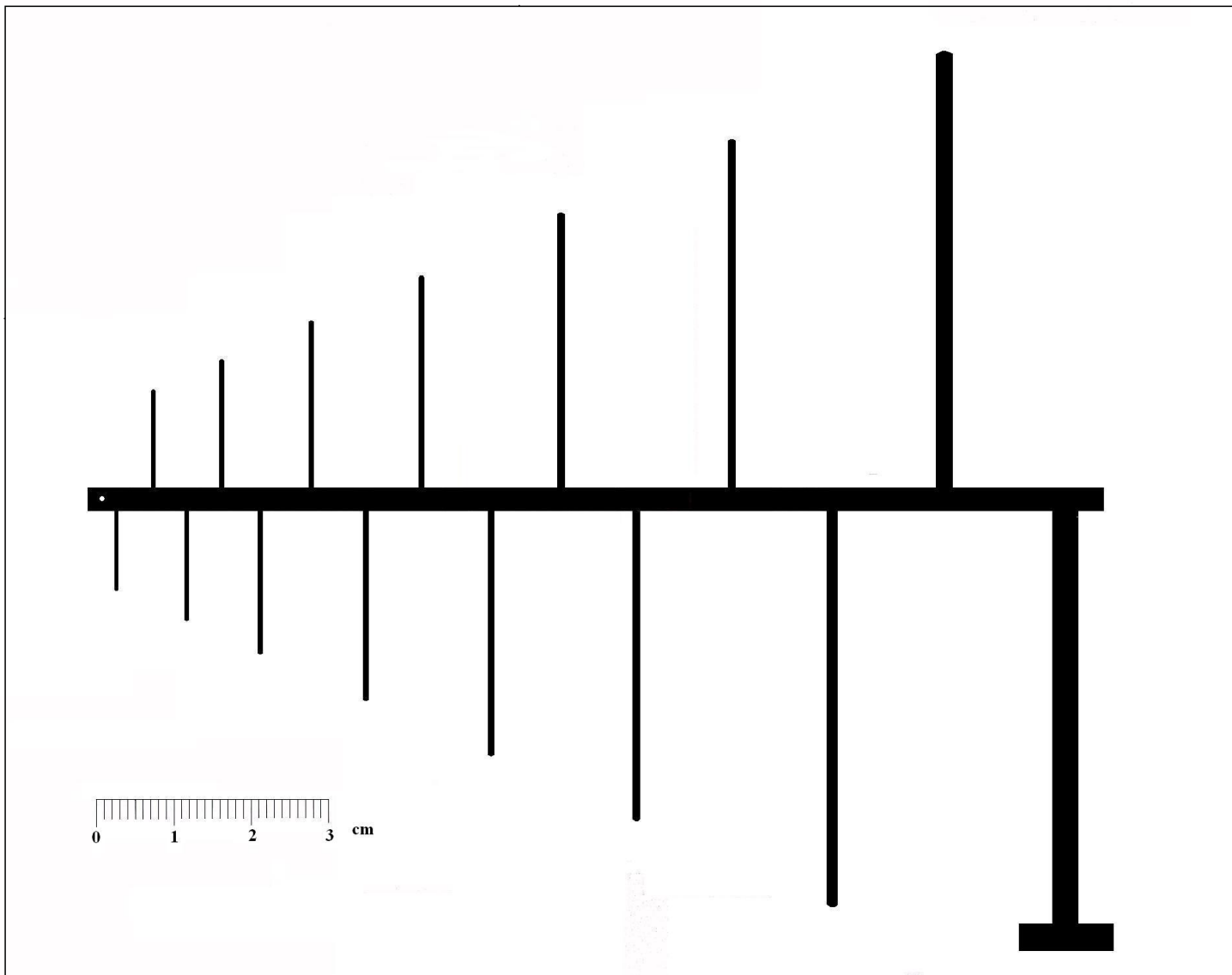
alti valori di potenza
riflessa

$\frac{P_r}{P_d}$	ROS	RL
0.1	1.925	10
0.09	1.857	10.458
0.08	1.789	10.969
0.07	1.72	11.549
0.06	1.649	12.218
0.05	1.576	13.01
0.04	1.5	13.979
0.03	1.419	15.229
0.02	1.329	16.99
0.01	1.222	20
0.005	1.152	23.01

....bassi valori di potenza
riflessa



Illuminatore Log periodic su vetronite FR4 per 1.1 – 6 GHz



Maschera dell'antenna log periodica da utilizzare su entrambe le facce di una bassetta di vetronite FR4 di 1.5 mm di spessore, ramata su due facce.

Lunghezza dipoli [mm]		Distanza elementi [mm]
L1 = 130.4		$d_{1-2} = 17.2$
L2 = 116.9		$d_{2-3} = 15.4$
L3 = 104.7		$d_{3-4} = 13.8$
L4 = 93.8		$d_{4-5} = 12.4$
L5 = 84.1		$d_{5-6} = 11.1$
L6 = 75.3		$d_{6-7} = 9.9$
L7 = 67.5		$d_{7-8} = 8.9$
L8 = 60.5		$d_{8-9} = 8.0$
L9 = 54.2		$d_{9-10} = 7.2$
L10= 48.5		$d_{10-11} = 6.4$
L11= 43.5		$d_{11-12} = 5.7$
L12= 39.0		$d_{12-13} = 5.1$
L13= 34.9		$d_{13-14} = 4.6$
L14= 31.3		$d_{14-15} = 4.1$
L15= 28.0		

Parametri:

$$\tau = 0.9$$

$$\sigma = 0.07$$

$$N = 15$$

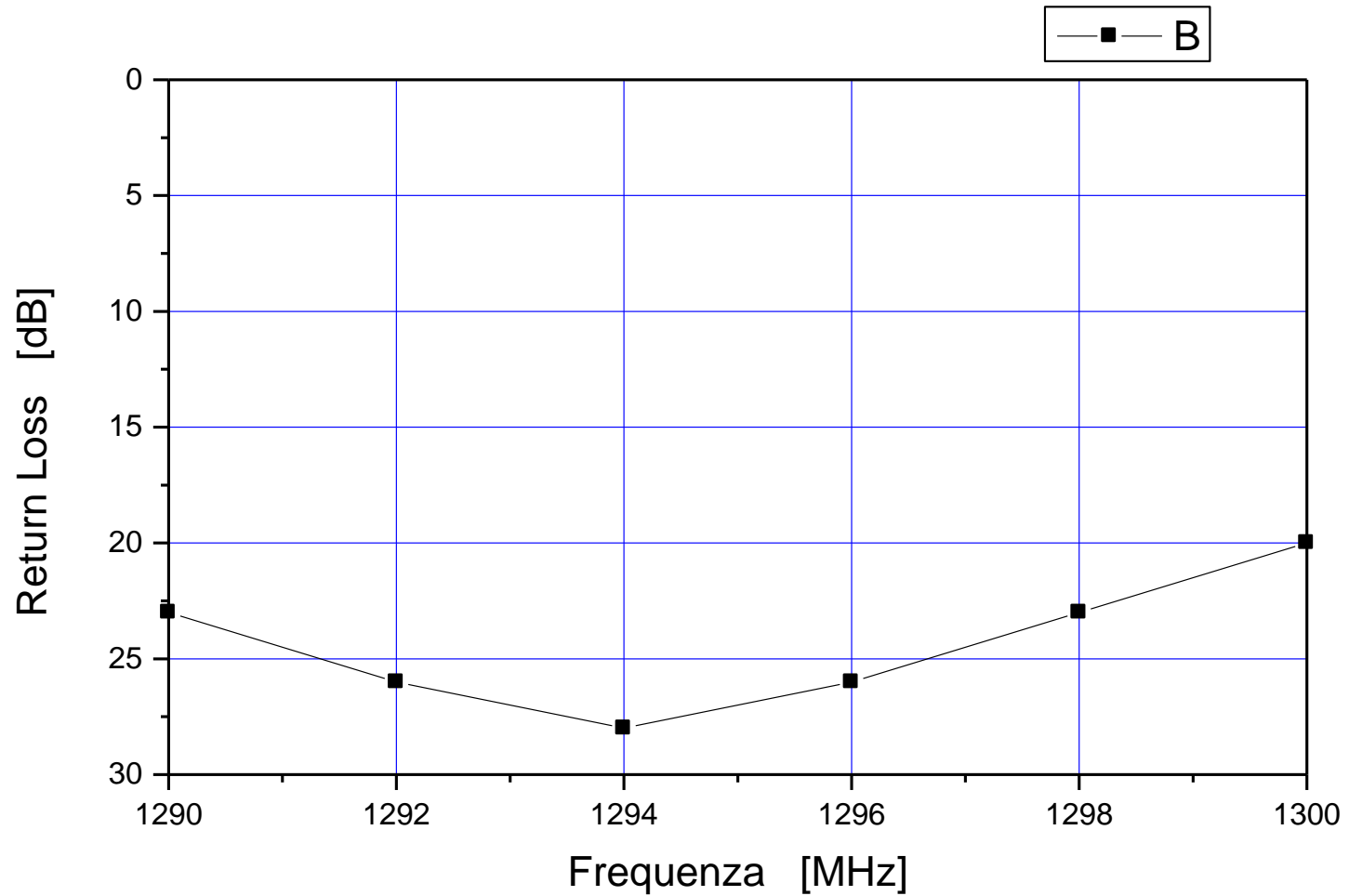
$$\text{Lunghezza} = 13 \text{ cm}$$

Frequenza:

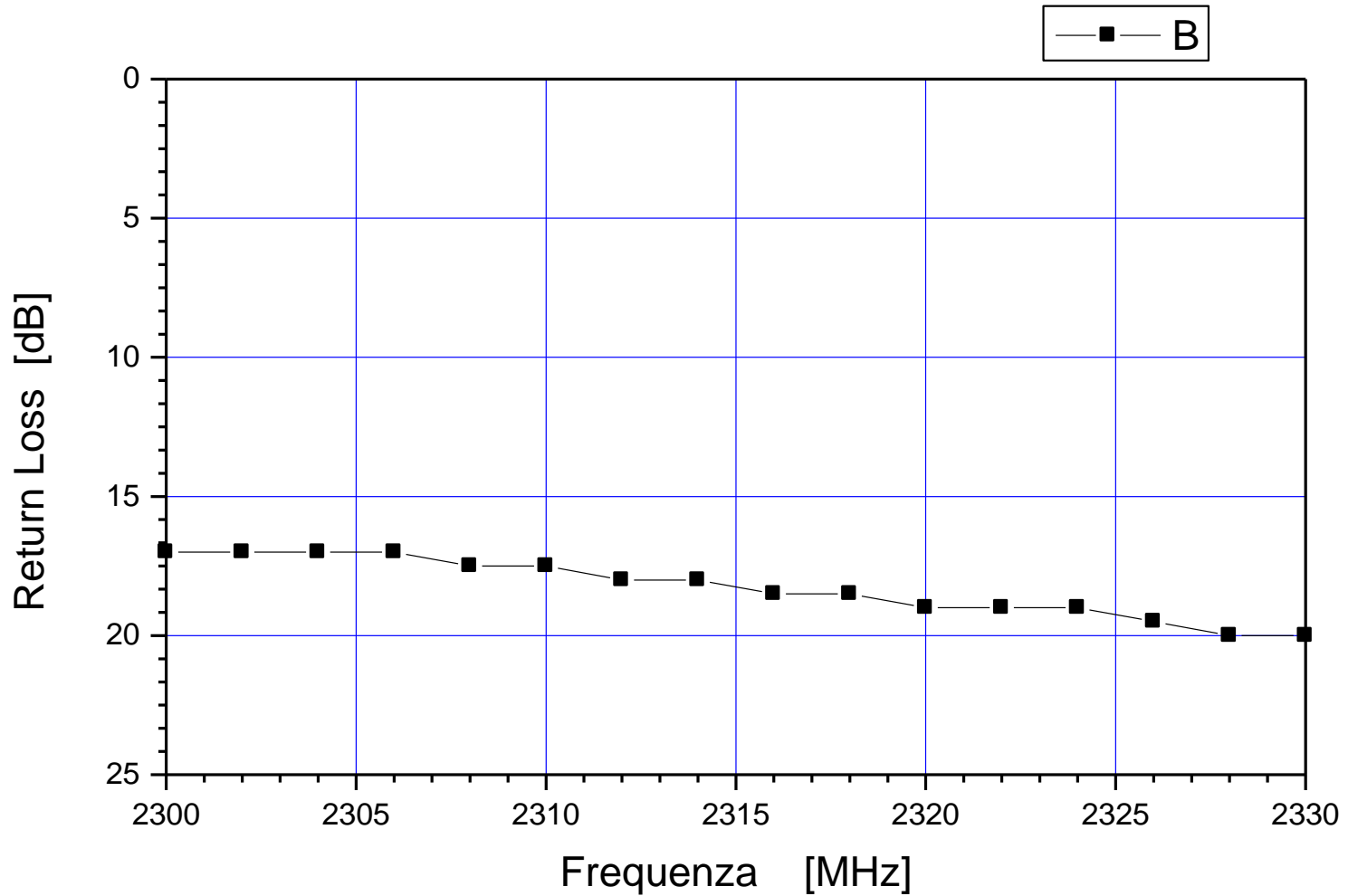
$$1.1 \text{ GHz} \div 6 \text{ GHz}$$

Gain : 6 dBi

Return Loss in banda 1296 MHz



Return Loss in banda 2.3 GHz



Return Loss in banda 5.7 GHz

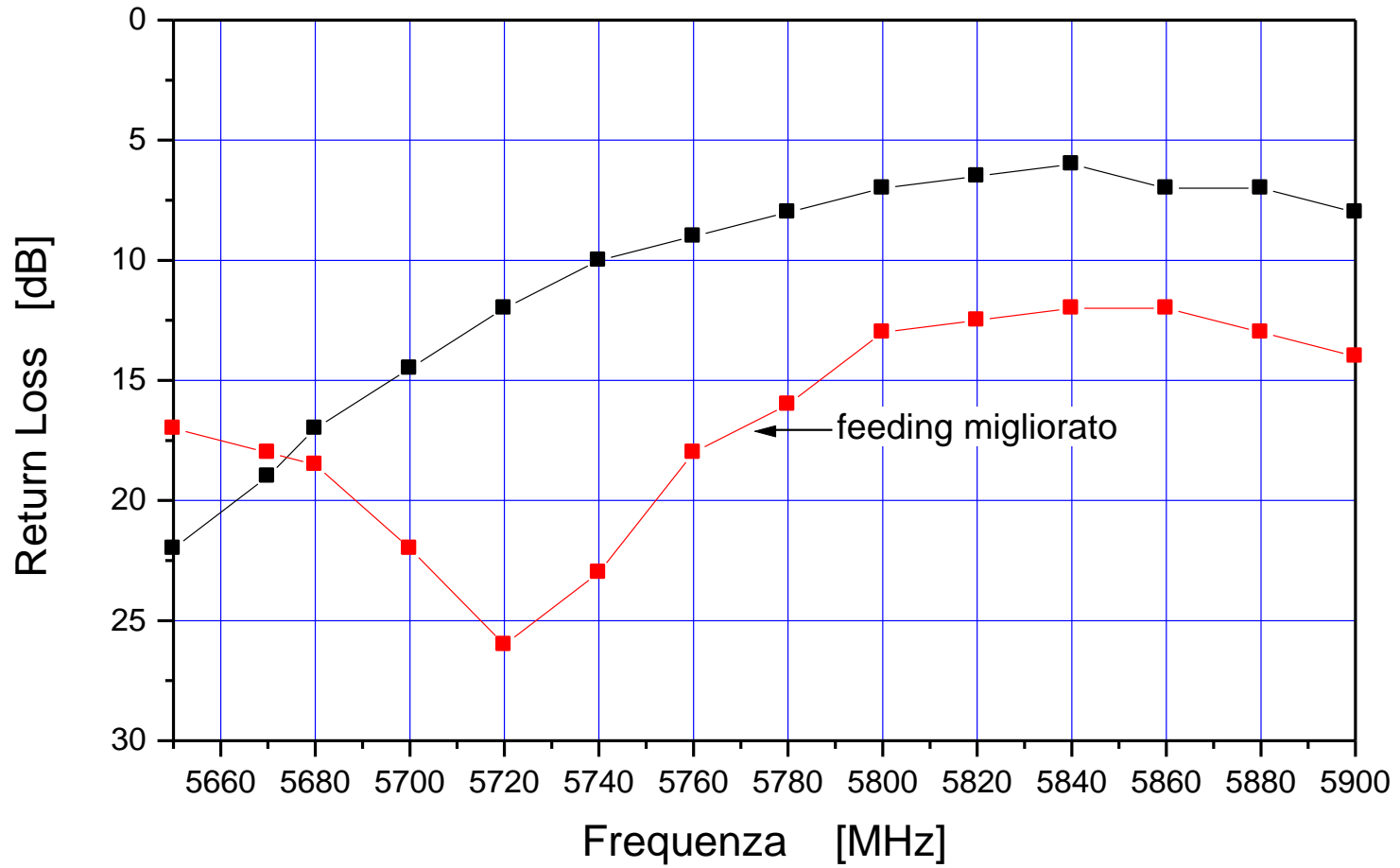
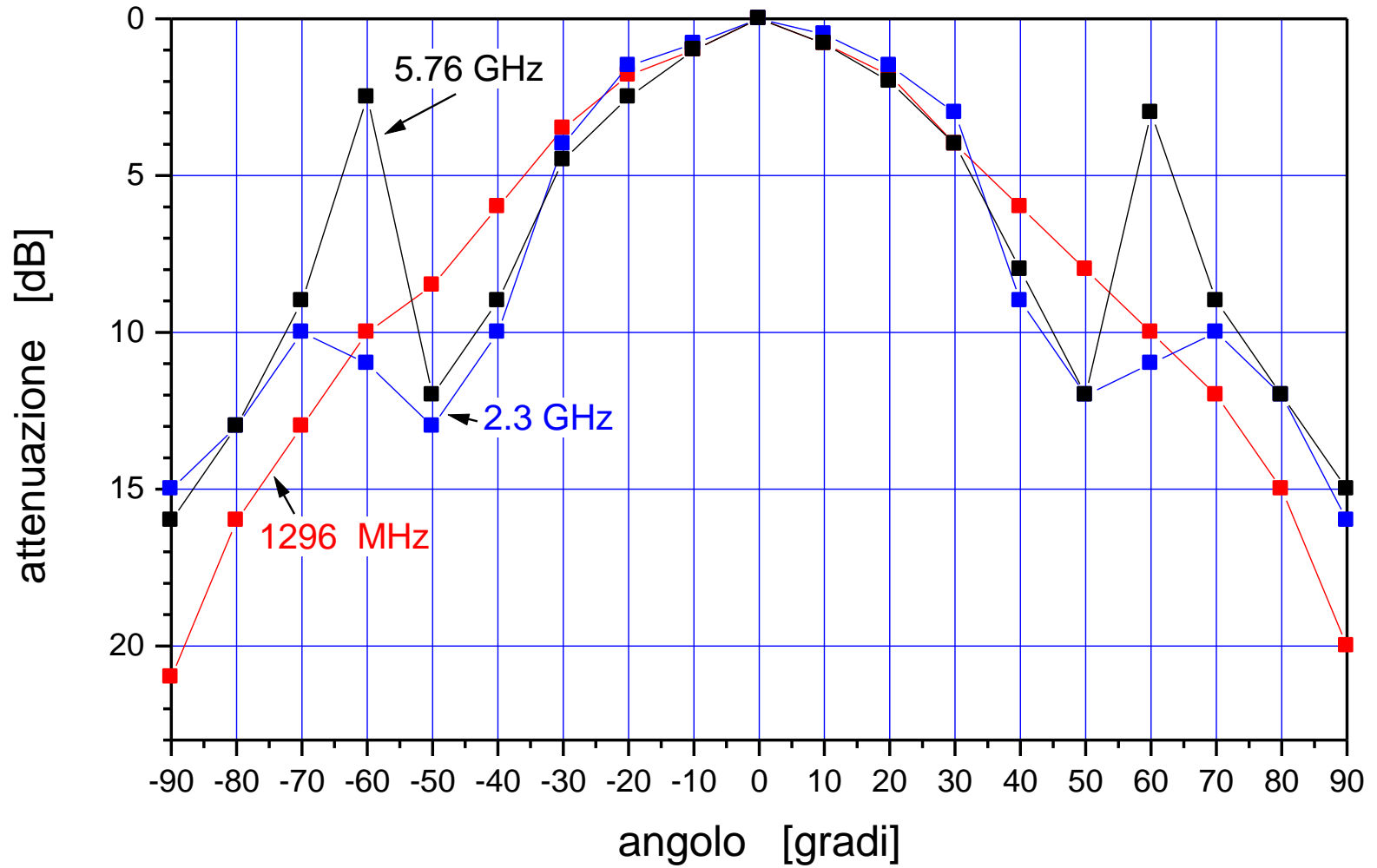
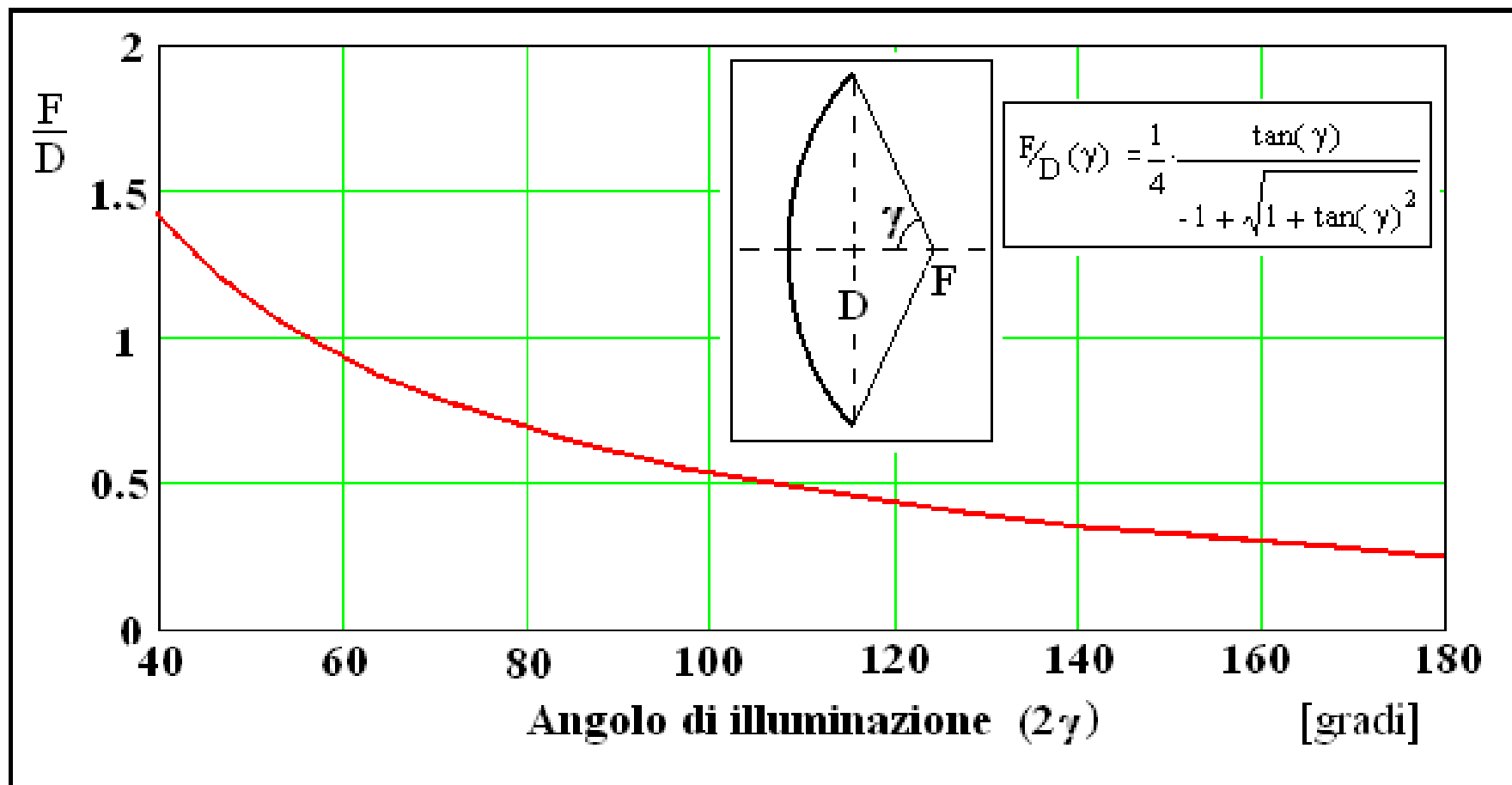


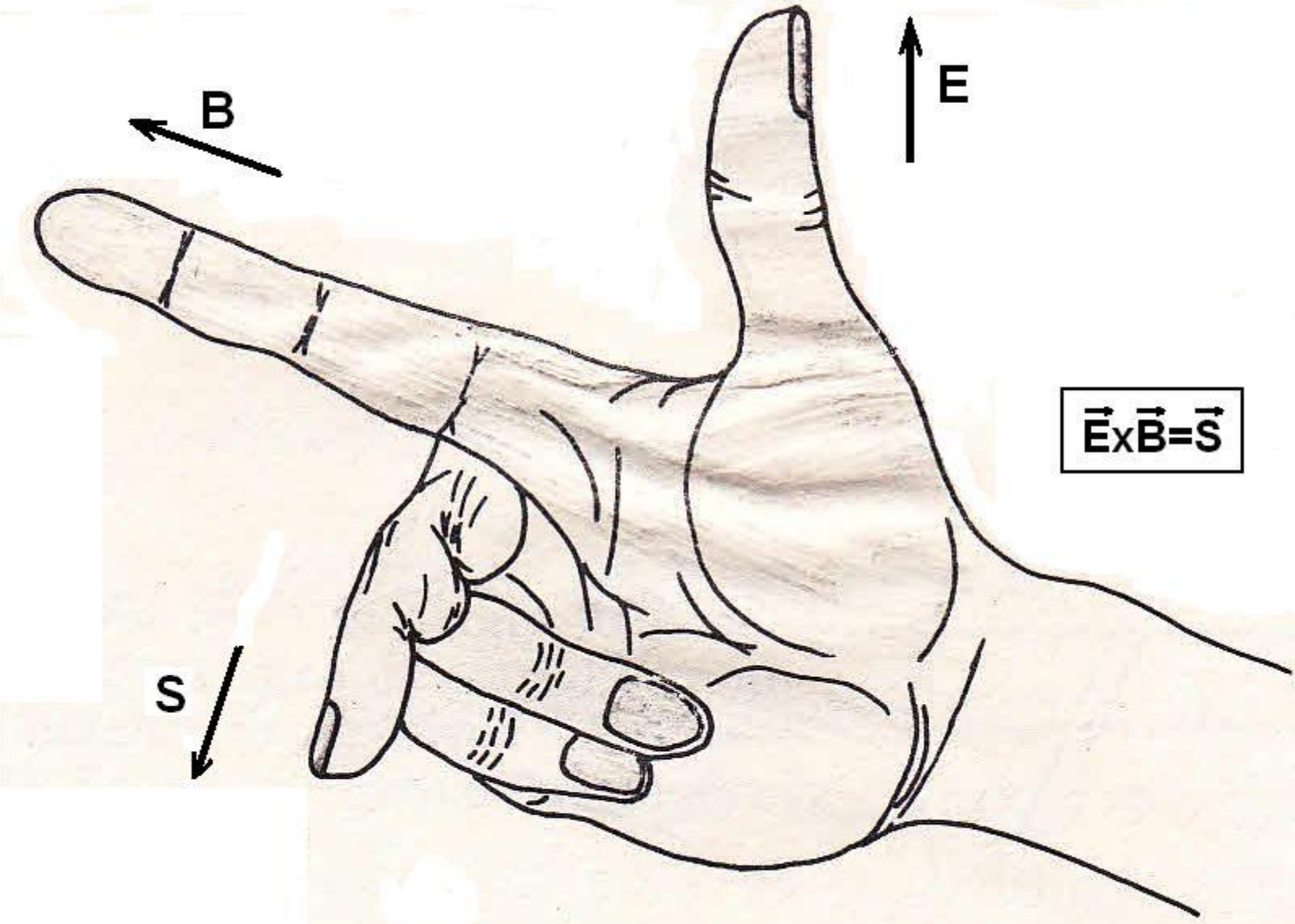
Diagramma di radiazione E-plane





Rapporto F/D in funzione dell'angolo di illuminazione dei bordi della parabola dal fuoco (2γ).



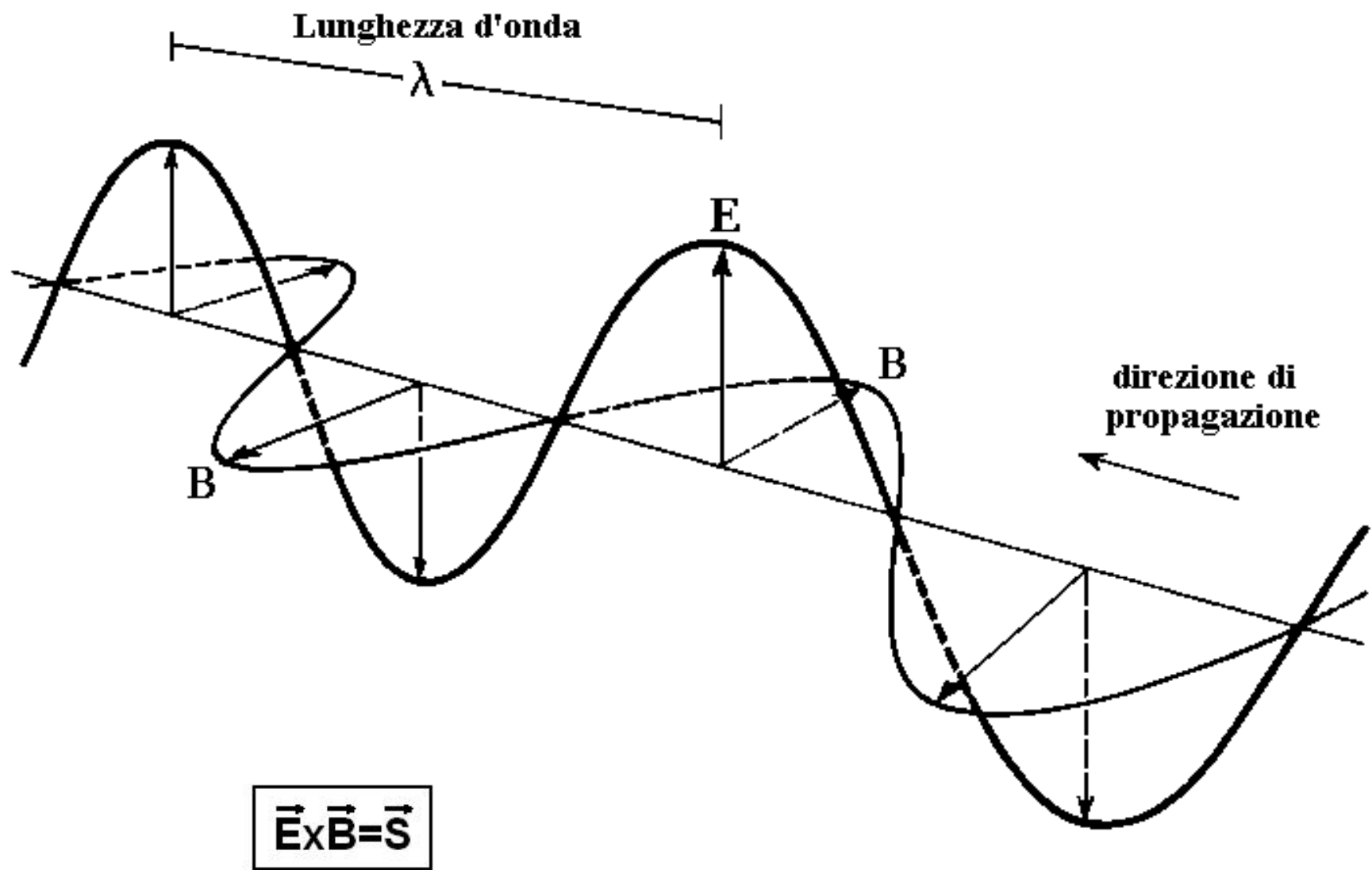


B

E

S

$$\vec{E} \times \vec{B} = \vec{S}$$



Lunghezza d'onda

λ

E

B

direzione di
propagazione

B

$$\vec{E} \times \vec{B} = \vec{S}$$

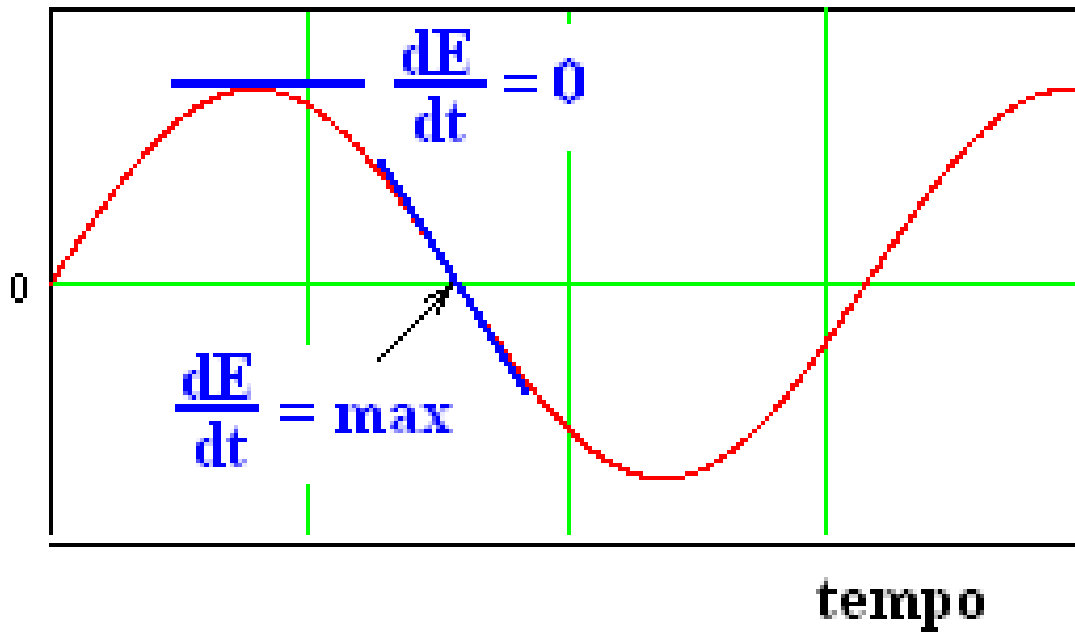
Equazioni di Maxwell

$$\operatorname{div} \mathbf{B} = 0 \qquad \operatorname{rot} \mathbf{B} = \mu \left(\mathbf{J} + \varepsilon \frac{\partial \mathbf{E}}{\partial t} \right)$$

$$\operatorname{div} \mathbf{E} = \frac{\rho}{\varepsilon} \qquad \operatorname{rot} \mathbf{E} = - \frac{\partial \mathbf{B}}{\partial t}$$

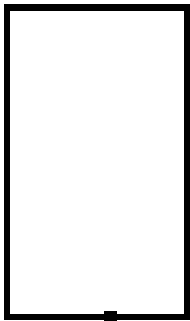
Nel condensatore, tra i due elettrodi c'è un forte campo elettrico variabile ed anche un campo magnetico, ma con sfasamento di 90 gradi.
Non c'è, quindi, irraggiamento.

Ampiezza



$$\vec{E} \times \vec{B} = \vec{S}$$

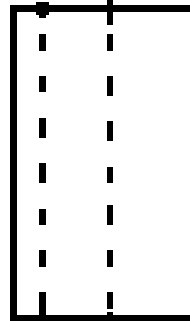
$$\vec{S} = 0 \quad (\text{nessun irraggiamento})$$



Prova

Circuito accordato LC

VSWR ≈ 1.2



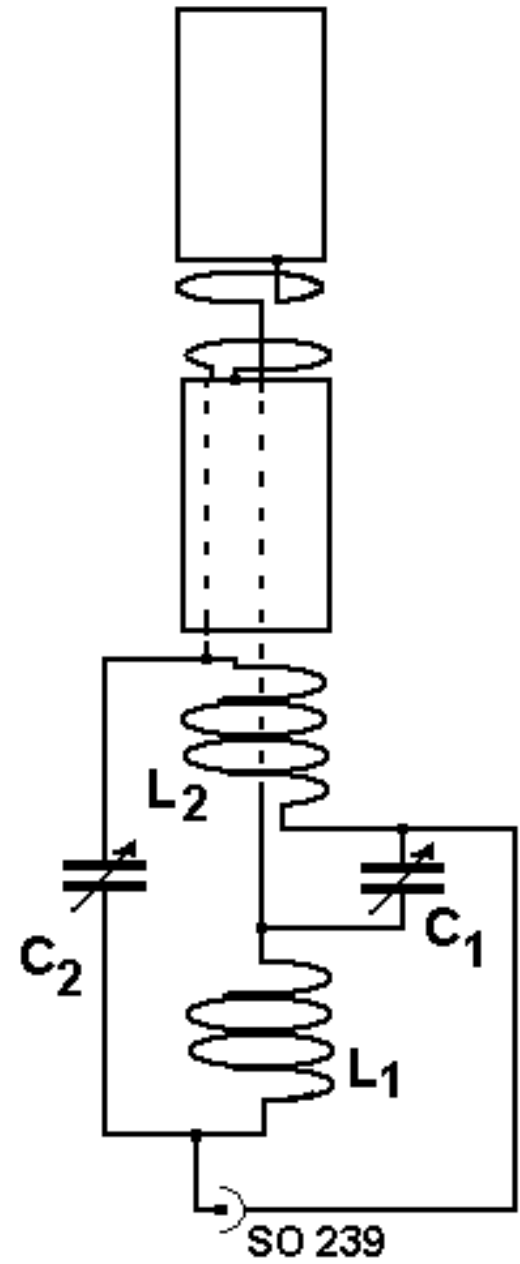
T₁



SO 239

NOT OK

Il condensatore non irraggia.
Il cavo non irraggia



EH Antenna

Hart T.

Antennas and Propagation, 2007. EuCAP 2007, The Second European Conference on , Page(s): 1-8

The **EH Antenna** is a new concept in **antenna** theory and incorporates the ability to simultaneously develop the E and H fields and in the proper physical relationship.

The ramifications of this new concept reveal capabilities that **antenna** Engineers have only been able to dream about, but not be able to realize, until now. This article provides the theory and operational examples explaining this concept, including descriptions of the individual performance parameters and how they compare to standard Hertz **antennas**.



EH-antenna per 7 MHz

Frequenza:
7050-7200 kHz
(VSWR < 1.5)

Potenza applicata:
100 W

RINGRAZIAMENTI a:

Marco IK4MZJ per avermi fornito l'antenna log-periodic per studio

Stefano IK5IIR per avermi fatto conoscere l'antenna EH, da lui introdotta in Italia e col quale ho collaborato tanto tempo fa..... (SK dal 2006).

