KAUNAS UNIVERSITY OF TECHNOLOGY

FACULTY OF ELECTRICAL AND ELECTRONICS ENGINEERING

DEPARTMENT OF ELECTRONICS ENGINEERING

APPLIED ELECTRODYNAMICS

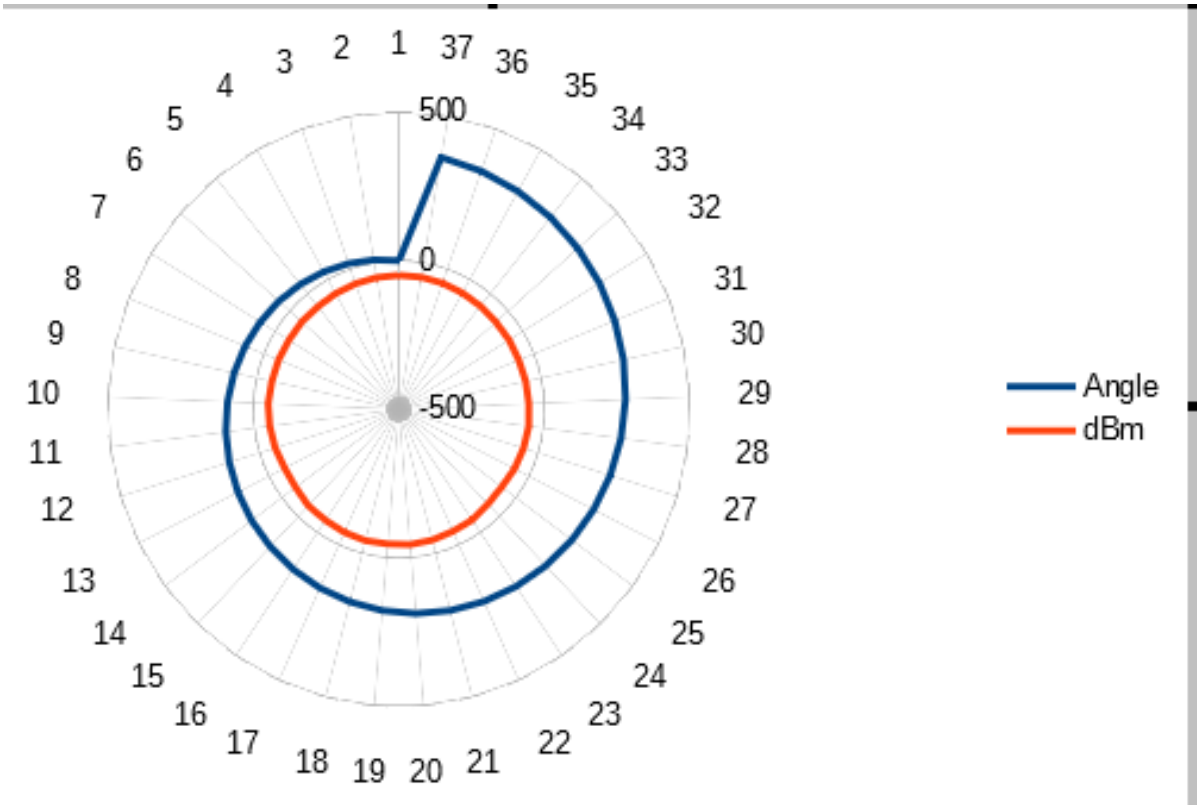
Student Name : Ulaş Can ACAR

Yagi Antenna Lab Work

Objective of this lab work is to measure the radiation pattern of Yagi antenna and to examine experimantally the influence of antenna on its radiation pattern

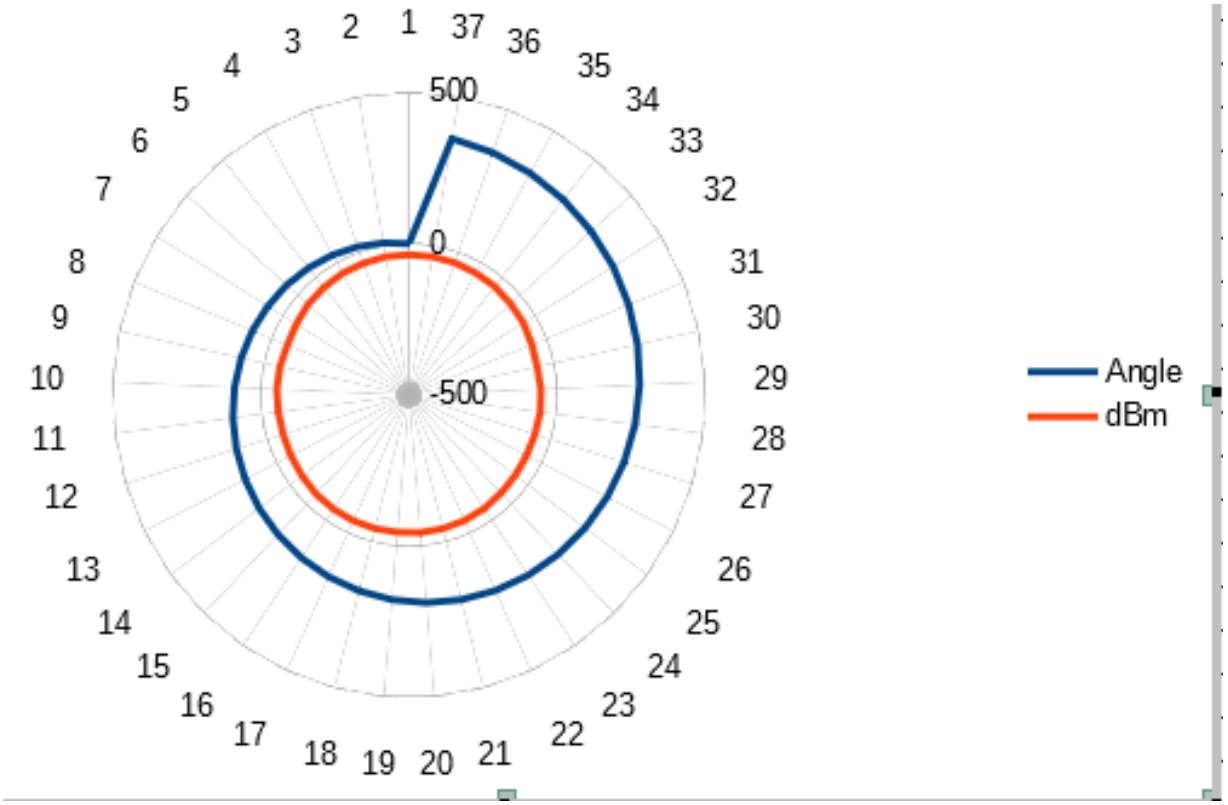
DİPOLE RADİATİON PATTERN

Angle	dBm
0	-49
10	-50
20	-52
30	-54
40	-56
50	-55
60	-56
70	-54
80	-53
90	-50
100	-52
110	-55
120	-60
130	-58
140	-50
150	-49
160	-45
170	-43
180	-45
190	-43
200	-45
210	-49
220	-50
230	-58
240	-60
250	-55
260	-52
270	-50
280	-53
290	-54
300	-56
310	-55
320	-56
330	-54
340	-52
350	-50
360	-49



OPTİMİZEDD REFLECTOR

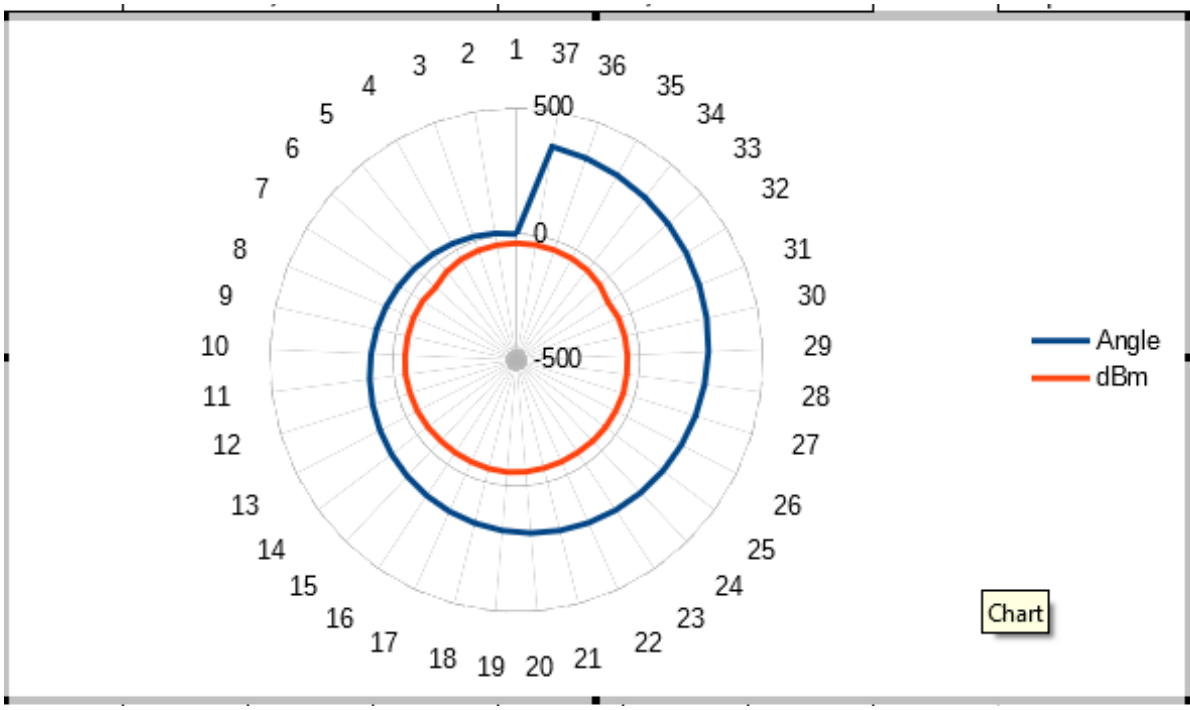
Angle	dBm
0	-36.1
10	-36.1
20	-38.1
30	-39.1
40	-43.1
50	-46.1
60	-53.1
70	-57.1
80	-54.1
90	-53.1
100	-55.1
110	-55.1
120	-53.1
130	-50.1
140	-46.1
150	-44.1
160	-43.1
170	-43.1
180	-44.1
190	-43.1
200	-43.1
210	-44.1
220	-46.1
230	-50.1
240	-53.1
250	-55.1
260	-55.1
270	-53.1
280	-54.1
290	-57.1
300	-53.1
310	-46.1
320	-43.1
330	-39.1
340	-38.1
350	-36.1
360	-36.1



Optimization of reflector						
Distance\Length	0,5λ=0,1m	Diference	0,51λ=0,102m	Diference	0,52λ=0,104m	Diference
0,15λ=0,03m	Front=-39,1	2	Front=-39,1	2	Front=-42,1	5
	Back=-37,1		Back=-37,1		Back=-37,1	
0,2λ=0,04m	Front=43,1	7	Front=-42,1	6	Front=-43,1	7
	Back=36,1		Back=-36,1		Back=-36,1	
0,25λ=0,05m	Front=-39,1	3	Front=-43,1	7	Front=-45,1	9
	Back=-36,1		Back=-36,1		Back=-36,1	

OPTİMİZED DİRECTOR

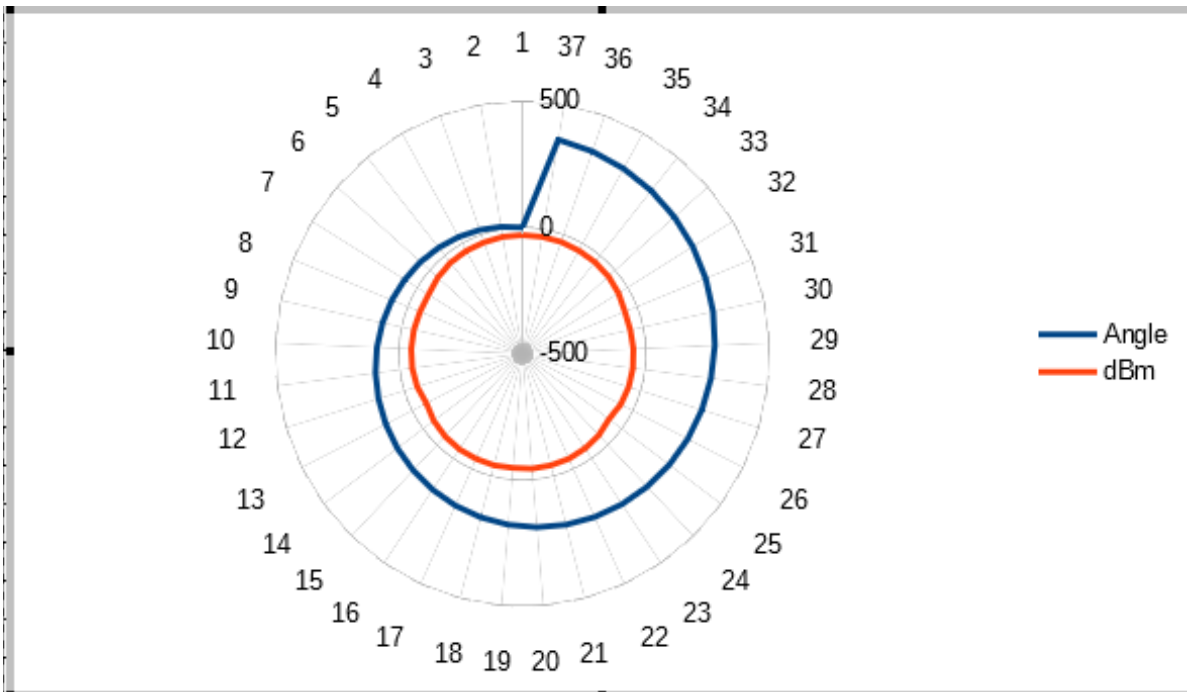
Angle	dBm
0	-36.1
10	-37.1
20	-38.1
30	-42.1
40	-49.1
50	-63.1
60	-53.1
70	-50.1
80	-49.1
90	-48.1
100	-46.1
110	-49.1
120	-50.1
130	-53.1
140	-56.1
150	-56.1
160	-56.1
170	-54.1
180	-53.1
190	-54.1
200	-56.1
210	-56.1
220	-56.1
230	-53.1
240	-50.1
250	-49.1
260	-46.1
270	-48.1
280	-49.1
290	-50.1
300	-53.1
310	-63.1
320	-49.1
330	-42.1
340	-38.1
350	-37.1
360	-36.1



Optimization of director						
Distance\Length	0,41λ=0,082	Diference	0,43λ=0,086m	Diference	0,45λ=0,09m	Diference
0,1λ=0,02m	Front=44,1	8	Front=-43,1	8	Front=45,1	6
	Back=36,1		Back=37,1		Back=39,1	
0,2λ=0,04m	Front=45,1	9	Front=50,1	14	Front=46,1	3
	Back=36,1		Back=36,1		Back=43,1	
0,3λ=0,06m	Front=55,1	19	Front=53,1	17	Front=45,1	7
	Back=36,1		Back=36,1		Back=38,1	
0,35λ=0,07m	Front=48,1	12	Front=44,1	9	Front=38,1	0
	Back=-36,1		Back=35,1		Back=38,1	

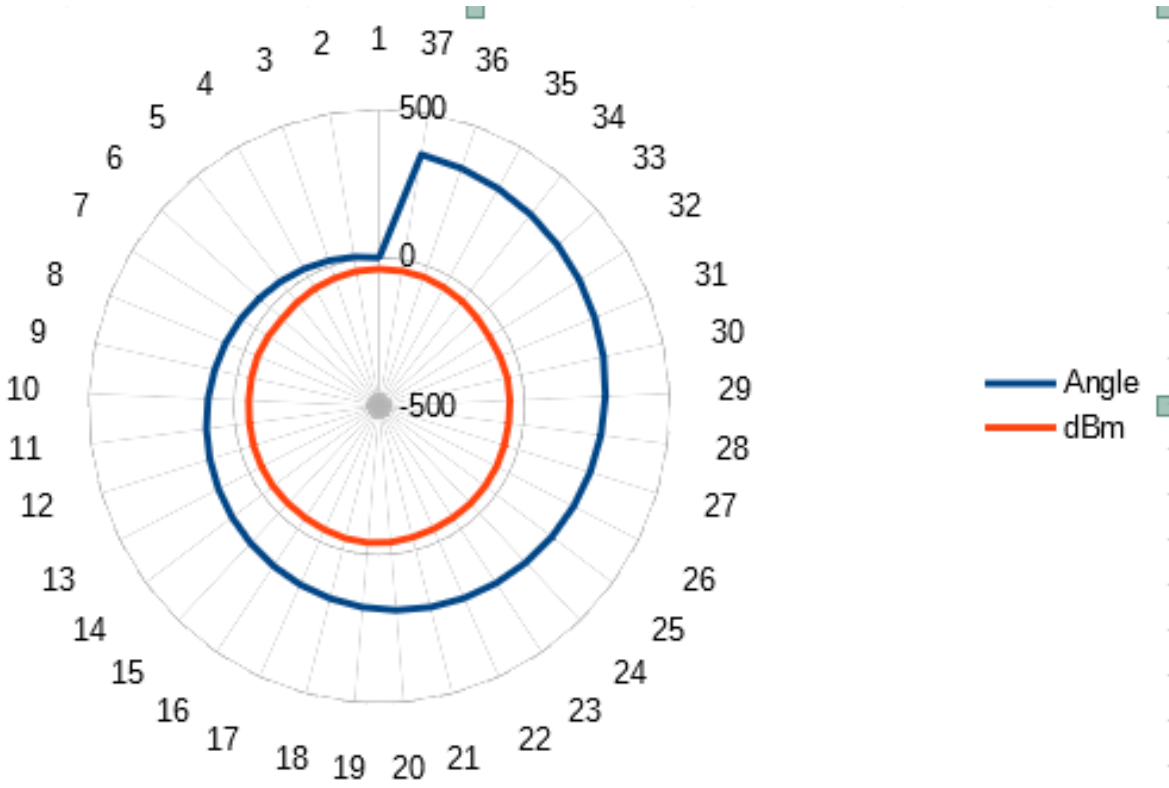
OPTİMİZED ANTENNA WİTH 1.35 GHz

Angle	dBm
0	-30.1
10	-30.1
20	-32.1
30	-33.1
40	-36.1
50	-43.1
60	-53.1
70	-53.1
80	-50.1
90	-49.1
100	-50.1
110	-54.1
120	-64.1
130	-53.1
140	-47.1
150	-43.1
160	-43.1
170	-43.1
180	-46.1
190	-43.1
200	-43.1
210	-43.1
220	-47.1
230	-53.1
240	-64.1
250	-54.1
260	-50.1
270	-49.1
280	-50.1
290	-53.1
300	-53.1
310	-43.1
320	-36.1
330	-33.1
340	-32.1
350	-30.1
360	-30.1



OPTİMİZED ANTENNA WİTH 1.65 GHz

Angle	dBm
0	-38.1
10	-38.3
20	-42.3
30	-45.3
40	-50.3
50	-54.3
60	-51.3
70	-48.3
80	-49.3
90	-50.3
100	-49.3
110	-47.3
120	-46.3
130	-45.3
140	-46.3
150	-45.3
160	-43.3
170	-39.3
180	-38.3
190	-39.3
200	-43.3
210	-45.3
220	-46.3
230	-45.3
240	-46.3
250	-47.3
260	-49.3
270	-50.3
280	-49.3
290	-48.3
300	-51.3
310	-54.3
320	-50.3
330	-45.3
340	-42.3
350	-38.3
360	-38.1



Conclusion:

Objective of this lab work is to measure the radiation pattern of Yagi antenna and to examine experimantally the influence of antenna on its radiation pattern in order to do that firstly we have wired dipole antenna on a certain frequency and examine how it is behave so we have changed the angle of antenna 10 degree with each measurement we have got a dBm range of 40 to 60 on certain angles after that we started to reflector optimization to do that we have changed the distance of reflector according to wavelength and examined front and back polarization and get the difference of that therefore we have found the optimal reflector distance moreover we did the same measurement to antenna like we did to dipole model while optimal reflector on
and we get a range of 36 to 63 dBm so the propagation decreases and increased on certain angles compared to dipole model.
Along with that we started to optimized the director
like we did to reflector with same parameters distance and front/back polarization difference in order to get optimal director furthermore we get the same range 36 to 63 dbm but on different angles .
On the other hand when you use both reflector and director on antenna and increase the frequency we have examined a range of 30 to 65 dBm on 1.35 GHz and 38 to 54 dBm on 1.65 GHz so means that it is not possible to get complete cancellation of waves but it is possible to get higher gain and front back ratio using parasitic elements with different frequencies