PERFORMANCE ANALYSIS POLARIZATION RECONFIGURABLE CIRCULAR PATCH BY COMPARING AXIAL RATIO FOR DIFFERENT POLARIZATION STATES

(SSE-21/12/256/4)-

PICO:

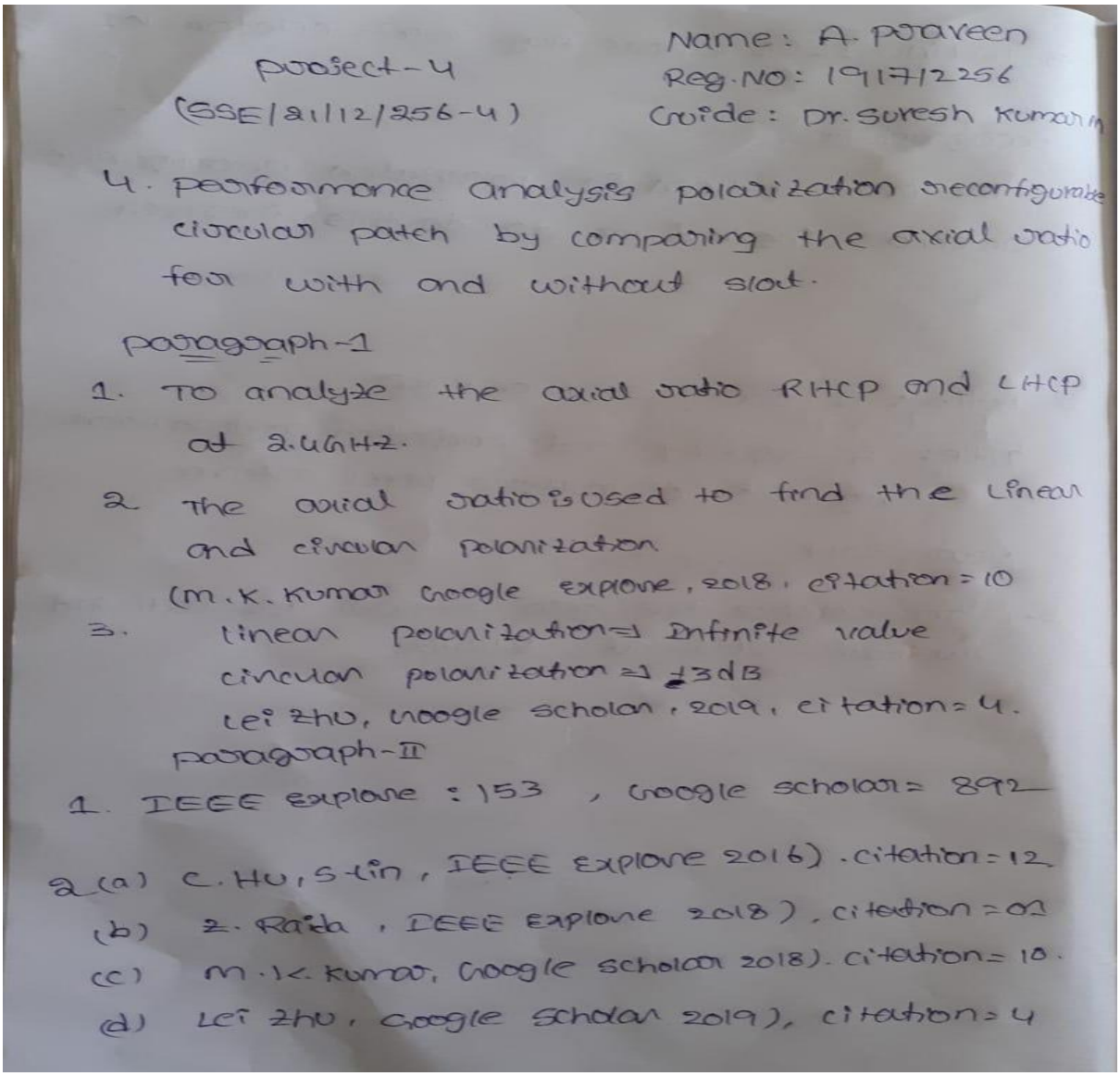
Problem: Less axial ratio bandwidth

Intervention: Surface current distribution orientation

Comparison: Axial ratio of with and without slot

Outcome: Frequency vs Axial ratio (with and without slot)

INTRODUCTION:



project-4
(SSE/21/12/256-4)

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Reg.NO: 19117/2256
Guide: Dr. Suresh Kumar M

4. Performance analysis polarization reconfigurable circular patch by comparing the axial ratio for with and without slot.

paragraph-1

1. TO analyze the axial ratio RHCP and LHCP at 2.4GHz.
2. the axial ratio is used to find the linear and circular polarization
   (M.K. Kumar Google explore, 2018, citation = 10
3. linear polarization = Infinite value
   circular polarization ≥ 1 ± 3dB
   Lei Zhu, Google scholar, 2019, citation = 4.

paragraph-II

1. IEEE explore : 153 , Google scholar = 892

2 (a) C. Hu, S. Lin, IEEE explore 2016). citation = 12
(b) Z. Raita, IEEE explore 2018), citation = 02
(c) M.K. Kumar, Google scholar 2018). citation = 10.
(d) Lei Zhu, Google Scholar 2019), citation = 4

3. C. Hu, S-Lin, IEEE Explore 2016), citation = 12

paragraph-III

1. surface current orientation and axial ratio performance to do this research.

2. Author: W. Wang

   Title: compact circularly polarized patch antenna with wide axial ratio beamwidth

   year: 2018.

3. To achieve the axial ratio four with and without slot at 2.4GHz

MATERIALS AND METHODS

materials and methods

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(SSE|21|12|256-4)

Title 4: performance analysis polarization reconfigurable circular patch by comparing axial ratio for with and without slot.

para-1

Study setting: saveetha school of engineering

NO. of groups: 2

sample size : 16

Total sample size : 32

power = 80%.

para-2

sample preparation group-1

Designing a circular patch with slot antenna using at 2.4GHz.

procedure:

1. Design a circular patch with slot antenna by calculating the axial ratio.
2. Give the feed between two patches
3. Give the radiation and boundary
4. analysis and frequency sweep
5. save and validate it.

para-3

sample preparation group-2

Designing a circular patch without slot antenna using HFSS at 2.4GHz.

procedure:

1. Design a circular patch without slot antenna by calculating the axial ratio.
2. Give the ground (perfect E)
3. Give the source to antenna.
4. Give frequency sweep and validated the design.

para-4

* Ansoft HFSS is a 3D electromagnetic simulation software for designing high frequency electronic product such as RF, antennas and filters.

* Circular patch antenna, length, width and radius and RT-duroid 5880 substrate were set.

Testing procedure:

* Assign RT-duroid material and frequency.
* calculating the length and width of patch using microstrip test line calculator.
* Assign bandary conditions
* Assign excitation
* Assign analysis setup
* Validating design
* Result analysis

para-5:

Data collection: Data entered in Excel.

para-6:

Statistical software used:

* HFSS software used for simulation and verification.
* ORIGIN V3.0 Software
* SPSS.

Independent variable:

* foreguency (GHz)
* RT- duroid (5880mm) constant
* RT- duroid (5880mm) height.

dependent variable:

* Axial Ratio

Analysis done:

comparing the axial ratio of circular patch antenna with and without at 8.4GHz was stimulated. (foreguency Vs magnitude).

Data Collection: with and without slot

S.NO	GROUP1	FREQUENCY	AXIALRATIO WITHSLOT	GROUP2	FREQUENCY	AXIALRATIO WITHOUTSLOT
1	1	2.25	36.06	2	2.25	57.37
2	1	2.30	30.20	2	2.30	31.90
3	1	2.35	21.80	2	2.35	14.83
4	1	2.40	14.83	2	2.40	5.46
5	1	2.45	21.16	2	2.45	2.56
6	1	2.50	28.77	2	2.50	5.25
7	1	2.55	34.14	2	2.55	11.68
8	1	2.60	38.01	2	2.60	20.75
9	1	2.65	40.94	2	2.65	31.62
10	1	2.70	43.21	2	2.70	43.62
11	1	2.75	44.99	2	2.75	56.26
12	1	2.80	46.36	2	2.80	69.22
13	1	2.85	47.39	2	2.85	82.28
14	1	2.90	48.11	2	2.90	95.32
15	1	2.95	48.54	2	2.95	108.29
16	1	3.00	48.70	2	3.00	121.21

Tables and graphs:

	group	N	Mean	Std. Deviation	Std. Error Mean
frequncy	withoutslot	16	2.6250	.23805	.05951
	withslot	16	2.6250	.23805	.05951
axialratio	withoutslot	16	37.0751	10.96832	2.74208
	withslot	16	47.3525	38.66077	9.66519

Independent Samples Test:

	Levene's Test for Equality of Variances		t-test for Equality of Means	
	F	Sig.	t	df
Equal variances assumed	.000	1.000	.000	30
Equal variances not assumed			.000	30.000
Equal variances assumed	20.899	.000	-1.023	30
Equal variances not assumed			-1.023	17.399

Comparison of axial ratio of with and without slot by varying the frequency ranging from 1GHz to 3GHz.there is statistically significant difference in axial ratio of with and without slot. The axial ratio of without slot is higher when compare to with slot.

Bar Chart Comparitive Means:

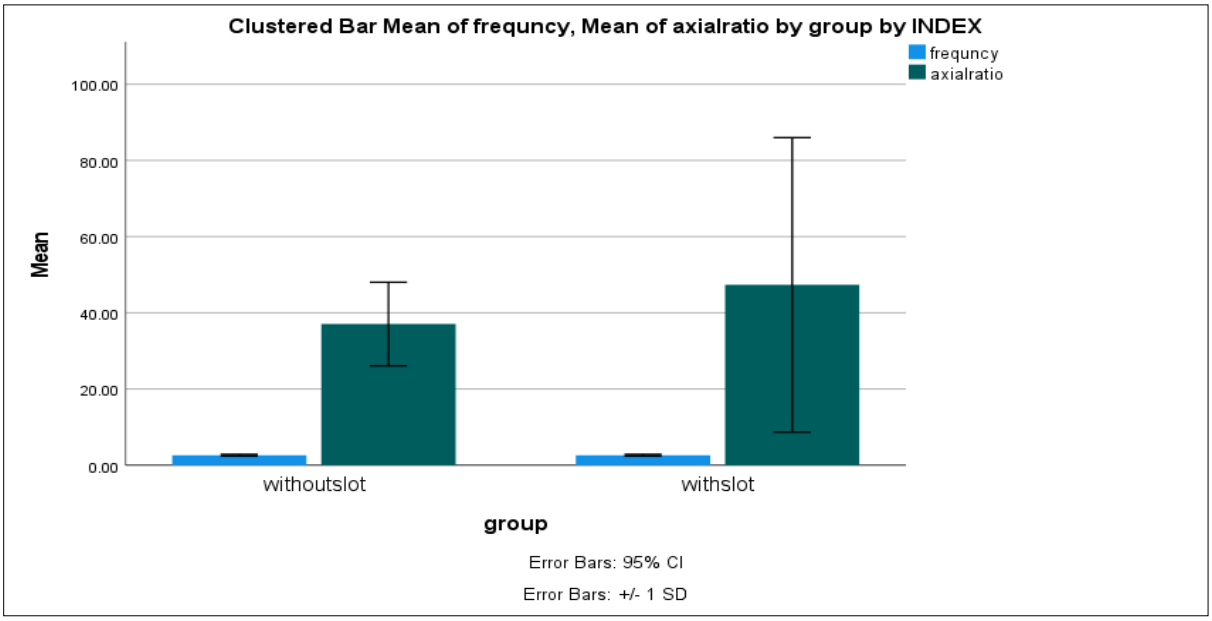
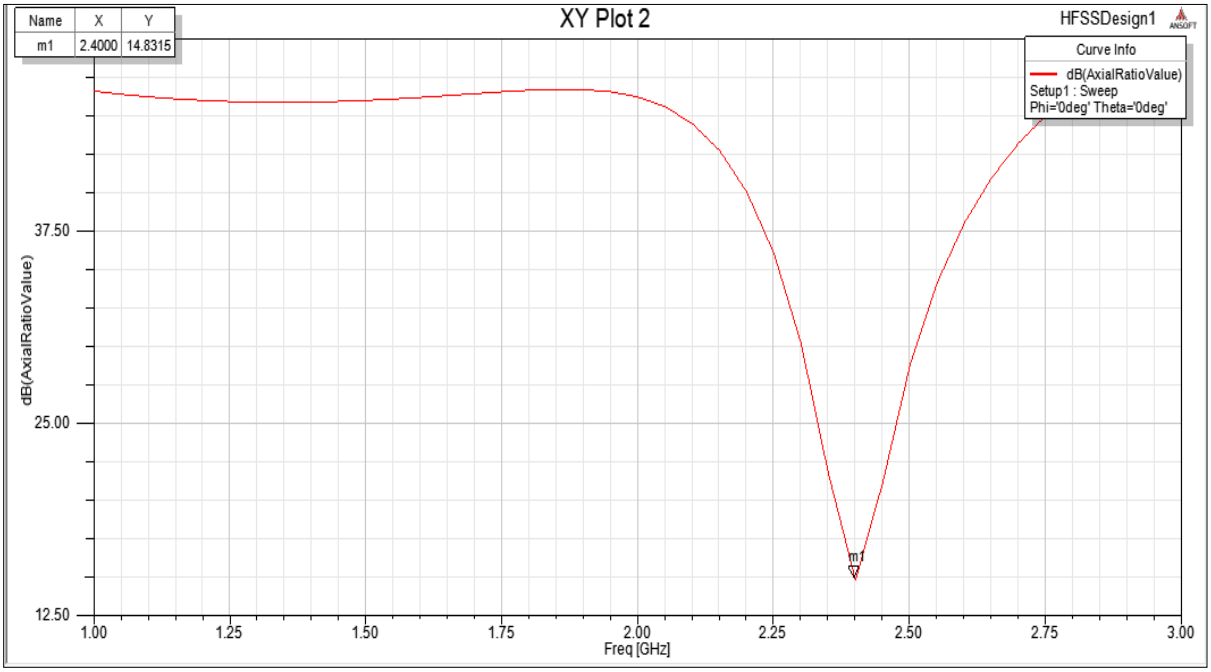


Fig. Bar chart comparing the mean axial ratio of with and without slot by varying the frequency. There is no significance difference between the two groups p>1.00(Independent sample t test).

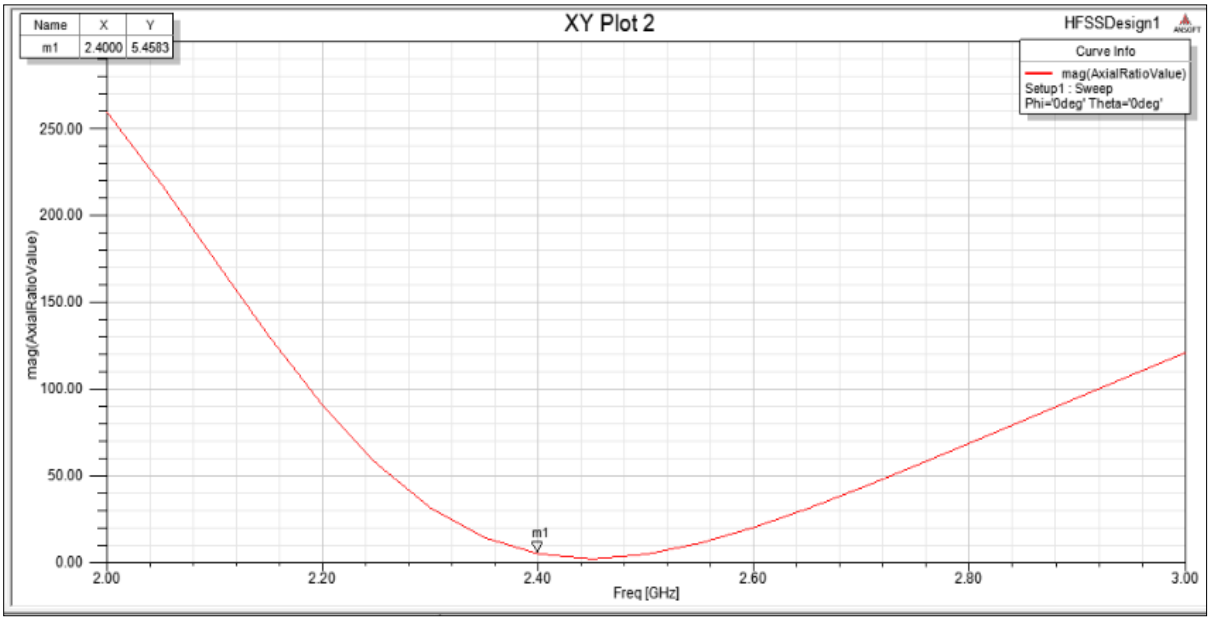
Results and discussion:

WITHOUTSLOT AXIAL RATIO:



Frequency at 2.4GHz and axial ratio without slot = 14.8315

WITHSLOT AXIAL RATIO:



Frequency at 2.4GHz and axial ratio without slot = 5.4583

DISCUSSION HINTS

project 4:

performance analysis polarization reconfigurable circular patch by comparing axial ratio for with and without slots.

para-1

The polarization reconfigurable circular patch antenna by comparing axial ratio for both with slot and without slot.

para-2

* The axial ratio of the circular polarization reconfigurable antenna. affected by slot creation.
* As increases the ~~ere~~slot creation and also increase the magnitude of axial ratio.

para-3

IEEE xplore citation = 12. , Google scholar citation = 10.

* M. wang, X. zhu, Y. Guo and W. wu - April-2018.

compact circularly polarized patch antenna with wide axial ratio Beamwidth.

* Khandelwal, M.K, Kuman, S & Kanaujia - April-2018.

Design and modeling and analysis of dual-~~band~~feed defected ground microstrip patch antenna with wide axial ratio bandwidth.

Modifications:

slot created with length = 10cm
and width = 9cm
Radius of the antenna = 20mm

future scope:

Good axial ratio for RHCP, LHCP and linear, fabricated in future.

Limitations:

Axial ratio (RHCP, LHCP and Linear) not exceed below "zero" when slot is created for comparing the with slot and without slots.

conclusion:

the ~~gain pattern~~ axial ratio of without slot is higher compare to with slot to find the more axial ratio bandwidth.

* without slot of ~~gain pattern~~ axial ratio is → 14.8315. (linear)
* and with slot of ~~gain pattern~~ axial ratio is → 5.4583 (circular)

Approved,
M.b
(Guide)