جامعة عبد المالك السعدي
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Université Abdelmalek Essaadi

Pole for Doctoral Studies
Center for Doctoral Studies
Sciences, Technologies, and Medical Sciences

ANNOUNCEMENT OF DOCTORAL THESIS DEFENSE

Ms. NAYAT ALI Oumaima

Will present here research work with the aim of earning a Doctorate

Doctoral program: Mathematics, Physics and New Technologies
Discipline: Physics
Specialty: Electronics & Telecommunications

On 17/07/2025 at 10H00 at the Marrakech Room of the Faculty of Sciences of Tetouan, UAE
Under the Theme

Deisgn of Low Cost Circularly Polarized Antennas with Beamsteering Capability

Front of the jury composed of:

First Name & Last Name	Establishment	Designation
Pr. ESSAAIDI Mohammed	ENSIAS of Rabat, UM5	President
Pr. KANJAA Mohamed	FS of Tetouan, UAE	Reviewer
Pr. ZAKRITI Alia	ENSA of Tetouan, UAE	Reviewer
Pr. AMAR TOUHAMI Naima	FS of Tetouan, UAE	Reviewer
Pr. KHALLADI Mohsine	FS of Tetouan, UAE	Examiner
Pr. ZUGARI Asmaa	FS of Tetouan, UAE	Examiner
Pr. AZNABET Mariem	FS of Tetouan, UAE	Co-Supervisor
Pr. EL MRABET Otman	FS of Tetouan, UAE	Supervisor

Research Laboratory: Intelligent System Design

Abstract

Antennas with beam steering capability have gained a lot of interest during the last decade and are being widely used in satellite communications, weather surveillance radars, and military radar systems owing to their ability to tackle many problems that wireless communications can suffer nowadays.

In this thesis, a novel circularly polarized antenna with four ports and loaded with complementary split ring resonator (CSRR) for beam steering applications without phase shifters or PIN diodes is presented. The single antenna loaded with CSRR is arranged in a rotational manner forming a 4-port structure. The separation distance among the four antennas is optimized for achieving a steering angle of 28◦ with an isolation level greater than 25-dB over the whole bandwidth.

When one of the four antennas is excited, the others either open-circuited or terminated to a 50-Ω impedance, the antenna has a resonant frequency of 5.8 GHz and produces a left-hand circularly polarized (LHCP) tilted beam in the elevation plane. The introduction of the CSRR leads to achieving a small design and also to get circular polarization characteristics.

The beam steering capability is originated from the mutual coupling with other antennas.The proposed structure has been fabricated and characterized expetimentally. The measured results show a radiation efficiency of 90% and a gain of 6 dBi over the whole bandwidth. This characteristic can be tuned which makes the proposed design suitable for many modern communication systems.

Keywords:: Circularly Polarized antenna, Beamsteering, metamaterials, CSRRs