Eman Galal Mahmoud Ibrahim Hassan

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Pesonal Information

Birth date : February 15, 1986.
Nationality : Egyptian.
Marital status : single.

Languages

- Arabic (Native)
- English (Excellent reading and writing)

Education

- October 2014 – October 2019 : Doctor of Philosophy (Ph.D)
  - School of Computing, Science and Engineering.
  - University of Salford, Greater Manchester, United Kingdom.
  - Date of graduation: August 2011.
  - Dissertation title: " A study of Microwave TDFT Applicator Design for Low Power Cancer Ablation," Supervisor: Prof. Haifa Takruri-Rizk, School of Computing, Science and Engineering, University of Salford, Greater Manchester, United Kingdom. Local Advisor: Amira Zaky, The Arab Academy for Science Technology and Maritime Transport, Alexandria, Egypt.

- September 2008 - August 2011 : MSc degree in Electronics and Communication Engineering
  - College of Engineering and Technology.
  - The Arab Academy for Science & Technology and Maritime Transport.
  - G.P.A.:3.92 “Excellent with Honor”.
  - Date of graduation: August 2011.
  - Master thesis: " Miniaturized Lowpass/ Bandpass Filters Using Defected Ground Structure (DGS) and Multi-layer Technique," Advisor: Prof. Darwish Abd El-Aziz and Dr. Mohamed Al Sharkawy, The Arab Academy for Science Technology and Maritime Transport, Alexandria, Egypt.

- September 2003 – July 2008: BSc degree in Electronics and Communication Engineering
  - College of Engineering and Technology.
  - The Arab Academy for science & technology and maritime transport.
  - G.P.A.:3.97 “Excellent with Honor”.

- Date of graduation: July 2008.
- Graduation project: “Multimedia Mobile Communications”, Advisor: Dr. Shawky Shaaban, The Arab Academy for Science, Technology and Maritime Transport, Alexandria, Egypt.
- Project grade: Excellent.

Work Experience

- November 2019 – Present: Arab Academy for Science & Technology and Maritime Transport, Alexandria, Egypt; Lecturer.
- Oct 2011 -October 2019: Arab Academy for Science & Technology and Maritime Transport, Alexandria, Egypt; Assistant Lecturer.
- Sept 2008 - Oct 2011: Arab Academy for Science and Technology and Maritime Transport, Alexandria, Egypt; Teaching Assistant.

Research interests

- Antenna analysis and design for therapeutic cancer ablation.
- Antenna analysis and design for wideband applications and wireless communication.
- Wearable and implantable antennas.
- Wireless sensors networks.
- Microwave Filter analysis and design backed by defected ground structure (DGS).

Publications

Publications

- Realization and Experimental Assessment of Baseball-Bat Microwave Antenna for Low Power Cancer Ablation," in *IEEE Journal of Electromagnetics, RF and Microwaves in Medicine and Biology*.

Abstract

Experimental assessment of using low power microwave ablation for treating focal tumor is presented in this article. Confinement of heating generated by microwave radiation is one of the major concerns in cancer treatment to maintain the acceptable functionality of the organ and alleviate radiation exposure towards surrounding tissues. Development of baseball-bat shaped (BSB) antenna has been studied using electromagnetic and thermal simulations and evaluated experimentally. Numerical simulations showed less than -10-dB reflection stability is attained for more than 20 GHz. Electromagnetic simulation showed that highly directed end-fire radiation achieves confined power deposition within targeted model and yields in higher SAR attained. Nearly spherical ablated lesions are achieved with no healthy tissues being destroyed in the backward direction. Proposed antenna was fabricated and tested in ex-vivo bovine liver sample and egg-white solution. Good agreement between simulated and measured results where confined ablated lesions attained at only 1W were comparable to that obtained at much higher power ranges (20-60W). Efficacy of BSB antenna to efficiently radiate in different dielectric mediums is noticeably attained. The proposed antenna model may help improving the precision of microwave ablation associated with commonly broadside radiators previously used in literature and provide homogenous SAR and confined heating to overcome the limitations found in treating spherical tumors with heterogeneous properties using much high power with narrow-band feature.

- "Investigation of Tear Drop Flared Tipped Antenna for Therapeutic Microwave Ablation," *2018 11th International Symposium on Communication Systems, Networks & Digital Signal Processing (CSNDSP)*, Budapest, 2018, pp. 1-6.

Abstract

Tear Drop Flared Tipped structure is proposed for microwave ablation therapy. Numerical simulations using ANSOFT High Frequency Structural Simulator is introduced to optimize the antenna design. The proposed design is modelled in

saline and liver tissues. With the advantage of ultra-wide bandwidth feature, the proposed antenna alleviates the high mismatch losses encountered with traditional narrow bandwidth designs recording more than -30 dB return loss over entire bandwidth with nearly spherical radiation. Results for return loss, VSWR, radiation pattern and SAR are presented.

- "Applicator design considerations of microwave tumor ablation," *2016 10th International Symposium on Communication Systems, Networks and Digital Signal Processing (CSNDSP)*, Prague, 2016, pp. 1-6.

Abstract

Tissue ablation is an image guided treatment option that selectively kills tumor cells by changing its temperature in such level that causes instantaneous cell death. This article provides an overview of the principles of microwave tissue heating and outlines design considerations for future research in microwave applicator designs. This research investigates new designs which are currently under test to achieve more compact antenna designs using different matching techniques to minimize as much reflection as possible, provide antenna designs more suitable for percutaneous treatment application and solve the overheating problem accompanied with microwave ablation therapy.

- "A Miniaturized Lowpass/Bandpass Filter using Double Arrow Head Defected Ground Structure with Centered Etched Ellipse," Progress in Electromagnetic Research Letters (PIERL 24), Chief Editor: J. A. Kong, Vol. 24, pp. 99-107, 2011.

Abstract:

A new double arrow head defected ground structure (DGS) with centered etched ellipse is proposed for designing a multilayer low pass filter (LPF) with wide rejection band and low insertion loss in the stop-band. The prototype LPF consists of three double arrow head DGS with centered etched ellipse in the ground plane and compensated capacitor on the top layer of a 30×40 mm2 Roger RT/Duroid5880 substrate having relative permittivity (εr) of 2.2 and thickness of 0.78 mm. The cutoff frequency is equal to 1.07 GHz .The prototype LPF is then realized as multilayer structure to enhance the filter response and reduce its size. The size reduction of the proposed multi-layer LPF is about 26% more than the conventional one. The proposed filter has been fabricated and measured. Good agreement is achieved between the simulated and measured results. The filter presents the advantages of compact size; low insertion loss and high out-band suppression. Finally, the multilayer LPF is transformed to band pass filter (BPF) using J-inverter method.

- "Design of Compact Microstrip Filter with Large Reject Band using a New Multi-Sections T-Shaped Defected Ground Structure and Multilayer Technique," Microwave and Optical Technology Letters, vol. 53, no. 8, August 2011.

Abstract:

In this article, a new compact defected ground structure (DGS) low pass filter (LPF) with wide rejection band, low insertion loss in the stopband, and sharp transition from passband to stopband is proposed. The prototype LPF is composed of three repetitive DGS elements with open stubs to act as a compensated capacitance. Each single DGS element consists of multisections of T-shaped slots. The filter is then realized as a multilayer structure to achieve size reduction and enhance the filter response. The proposed filter has been fabricated and measured. The agreement between the simulated and measured results confirms the effectiveness of the proposed concept. Finally, multilayer LPF is transformed to band pass filter using J-inverter method.

- Design of Ultra-Wide Stop-Band DGS Low-Pass Filter Using Meander- and Multilayer Techniques," Microwave and Optical Technology Letters, vol. 55, no. 6, June 2013.

Abstract:

This article presents a new dog-bone defected ground structure (DGS) for low-pass filter (LPF) applications with wide rejection band and low-insertion loss in the pass-band region. The prototype LPF consists of three dog-bone cells in the ground plane with an open stub on the top layer acting as a compensated capacitor. The prototype LPF is then realized as a multilayer structure to enhance the filter response and reduce its size. The size reduction of the proposed multilayer LPF is about 34% more than the conventional one. The proposed filter has been fabricated and measured. Good agreement can be realized between the electromagnetic simulation and the measurement results. To minimize the difference between the simulation and measurement results, and at the same time to reduce the loss in the pass-band region, a modification to the topology of the structure with the aid of the meander idea is used. The meander-filter presents advantages of compactness, low insertion loss, and high out band suppression. The dog-bone DGS cell is then

used as a photonic band gap structure to minimize the coupling between two probe-fed patch antennas and to improve the two antenna element array efficiency.

- "A Novel Elliptical Slotted Arrow-Head Defected Ground Structure for Realizing Multi-Layer Low Pass Filter with Wide Rejection Band," AES-ATEMA 2011 International Conference, Montreal, Canada, August 2011.

  Abstract:

  In this article, a new elliptical slotted arrowhead defected ground structure (DGS) is proposed for designing a multilayer low pass filter (LPF) with wide rejection band and low insertion loss in the stop-band. The prototype LPF consists of three elliptical slotted arrowhead DGS cells etched in the ground plane with a compensated capacitor on the top layer of a 30×40 mm^2 Roger RT/Duroid5880 substrate having relative permittivity (ε_r) of 2.2 and thickness of 0.788 mm. The cutoff frequency is equal to 1.07 GHz .The prototype LPF is then realized as multilayer structure to enhance its response and to reduce the filter size. The size of the proposed multi-layer LPF is reduced by about 26 % relative to the conventional one. The filter presents the advantages of compact size, low insertion loss, and high out-band suppression.

Teaching Courses

Undergraduate courses

- Teaching fundamentals and basic principles of different antenna configurations, analyzing and computing both field patterns for single and array elements (EC544 Antenna Engineering).

- Teaching fundamentals and basic principles of different microwave devices such as varactors, tunnel diode, and gunn diode. Moreover, teaching microwave amplifiers such as klystron, TWT amplifier. (EC546: Microwave Technology).

- Teaching different types of crystal structures of solid materials, different types of bonds, Quantum mechanics and semiconductor materials (EC210 Solid state Electronics).

- Teaching different solid materials and electronic devices such as, semiconductor diodes, BJT, FET, operational amplifiers and digital gates. (EC331: Electronics).

- Teaching Undergraduate courses of measurements and instrumentation methods in electrical circuits.

Personal Skills

- Reliable and organized.
- Punctual and honest.
- Hard worker and ability to work in a group or individually according to the job requirements.
- Ability to work under pressure.
- Advanced Research Abilities.
- Leadership skills.

References

- **Prof. Dr. Darwish Abdelaziz Mohamed**

  Professor at Electronics and Communications department.
  School of Engineering, Arab Academy for Science and Technology

Former Chairman of Electronics and Communications Department (Aug 2008 - Aug 2012)
P.O. Box 1029 Miami, Alexandria, EGYPT
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- **Mohamed Al Sharkawy, Ph.D.**

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- **Amira Zaky , Ph.D.**

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