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قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
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HANAA ALY

VOLUME INTEGRAL EQUATIONS FORMULATION FOR PLASMONIC NANO DEVICES IN LAYERED MEDIA

By

Esraa Mohamed Abdelkhaleq Mahdy

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
MASTER OF SCIENCE
in
Engineering Physics

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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Under the Supervision of

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Approved by the
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Title of Thesis:

Volume Integral Equations Formulation for Plasmonic Nano Devices in Layered Media

Key Words:
Plasmonics; Volume Integral Equations; Discrete Complex Images; Method of Moments; Nanoantennas

Summary:

This thesis presents a volume integral equation formulation for plasmonic nano devices in planar multilayered media. This integral equation is solved numerically using the Method of Moments (MoM). The proposed formulation is used to study different nano structures immersed inside layered media. The structures include nano-rods in layered medium excited by plane wave, nano patch antenna in layered medium excited by plane wave, nano patch antenna in layered medium excited by transmission line, and two coupled nano patch antennas located at both side of a substrate and excited with transmission lines. The obtained current distributions and S-parameters are compared with those obtained using CST Microwave Studio. A very good agreement is concluded.

Disclaimer

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

Name: Esraa Mohamed Abdelkhaleq Mahdy   Date: ../../…

Signature:

Dedication

To my family and friends

Acknowledgments

Foremost, I would like to thank Allah, the almighty, for giving me the strength, patience and courage to do this work. This thesis would not have been accomplished without the guidance and support of my supervisors, colleagues, friends and family that I would like to express my gratitude to them.

With my greatest pleasure, I would like to thank my advisors Prof. Dr. Alaa K. Abdelmageed and Prof. Dr. Ezzeldin A. Soliman.

I am deeply grateful to Prof. Alaa Abdelmageed for the endless support and continuous motivation. I am thankful to him for introducing me to this research project. I am extremely inspired by his dynamism and methodology of problem solving. Before working with Prof. Alaa, he was my professor for two important graduate courses in the field of electromagnetics and he inspired me to work in this interesting area of research. He helped to study and understand electromagnetic from the basics up to the advanced levels.

I would like to express my sincere appreciation to Prof. Ezzeldin Soliman for his efforts, constant guidance, and invaluable suggestions and ideas. I am grateful to him for giving me this opportunity of joining his research group at AUC and working under his supervision. I am very thankful to him for his persistence to tackle research challenges faced throughout the work. I learnt a lot from his experience and enormous knowledge.

I would also like thank my examination committee members: Prof. Dr. Amr Shaarawi, Professor at School of Sciences and Engineering in the American University in Cairo, and Prof. Dr. Tamer M. Abuelfadl, Professor at Electronic and Electrical Communications Engineering in Cairo University, for their time and efforts in revising my thesis. They provided me with constructive feedback and helpful comments.

Many thanks to all my colleagues in the Engineering Physics Department, Cairo University. I am grateful to Marina, Sarah, Mostafa, Ahmed and Hussein for helping me in the graduated courses. I also would like to thank Hassan, Yasser, Haitham, Mohamed Alaa, and Mohamed Ashraf for making the teaching load, during preparing the thesis, enjoyable.

I am grateful to my friends Sara, Thuraya, Rania, Nada, Yomna, Hajar, and Shrouk for their continuous motivation and emotional support. They made this journey wonderful. Thanks to the playful Biso, he was the best companion while writing the thesis.

I am deeply thankful and indebted to my parents for supporting and encouraging me. Their endless care, support and prayers are always surrounding me. Thanks to my little sister, Haidy, for always providing me with positive energy. Thanks to my parents-in-law for caring and supporting me. I am thankful to all my family for always believing in me, I would not reach this point without them.

Last but not least, I am extremely grateful to Abdelrahman, my loving husband, without his love, support and understanding, this work would not come into existence. I am so thankful that I have him with me, pushing and encouraging me, when I was ready to give up.

Esraa Mahdy
February, 2020

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