

# ;Dedication

To my father

And

The soul of my mother

Acknowledgement

I would like to express my gratitude to my supervisor

Prof. Mubarak Dirar Abd-Alla for his kind supervision Special thanks to Sudan University of Science & Technology, and College of Graduate Studies, and also to the college of science. Thanks also extend to Osama Azhari Mohamed for helping me in writing this manuscript.

الاية

بسم الله الرحمن الرحيم

انما الهكم الله الذي لا اله  
الا هو وسع كل (98) شئ علما

صدق الله العظيم

سورة طه الاية (98)

## Abstract

In this work amplification of electromagnetic waves is related to the phase between the external and internal field. It is shown that amplification exists

when the external and internal fields are in phase. When the two fields are normal to each other no amplification exists. While absorption happens when the two fields apposes each other

## الملخص

في هذا العمل تم ايجاد علاقة الطور بين المجالين (الداخلي والخارجي) وتضخيم الموجات

الكهرومغناطيسية . وقد وضح ان التضخيم يكون حاضرا  
متي ما كان المجالين (الداخلي والخارجي) في طور واحد  
. وعندما يكون المجالين متعامدين لبعضهما البعض ينعدم  
التضخيم . بينما يحدث الامتصاص عندما يعاكس المجالين  
بعضهما البعض.

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