



ADAPTIVE NEAR-FIELD FOCUSING FOR WIRELESS POWER TRANSFER APPLICATIONS

By

Boules Atef Mouris Nessim

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfilment of the
Requirements for the Degree of
MASTER OF SCIENCE
in
ELECTRONICS AND COMMUNICATIONS ENGINEERING

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Title of Thesis:

ADAPTIVE NEAR-FIELD FOCUSING FOR WIRELESS
POWER TRANSFER APPLICATIONS

Key Words:

Wireless Power Transmission, Adaptive Antenna, Near-Field Power Focusing,
Source Localization, Beamforming

Summary:

A wireless power transfer system based on the concept of Near-Field Focusing is proposed in this thesis. The proposed system uses Multiple Signal Classification algorithm for localizing the targets. A Minimum Mean Square Error beamforming technique is subsequently used in order to focus the RF power at the targets locations. Different parameters impacting the power transmission efficiency are studied. Results show a relatively high power density at the desired locations

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Dedication

To my family and my friends

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List of Symbols and Abbreviations

Abbreviations	Description
BTS	Base Station.
DC	Direct Current.
DOA	Direction Of Arrival.
EIRP	Effective Isotropic Radiated Power.
EM	ElectroMagnetic.
ESPIRIT	Estimation of Signal Parameters via Rotational Invariance Technique.
MMSE	Minimum Mean Square Error.
MUSIC	MUltiple Signal Classification.
MVDR	Minimum Variance Distortionless Response.
NFF	Near-Field Focused.
PEC	Perfect Electric Conductor.
Rectenna	Rectifying-Antenna.
RF	Radio Frequency.
RFID	Radio Frequency IDentification.
ULA	Uniform Linear Array.
WPT	Wireless power transfer.
Symbols	Description
λ	Wavelength.