بسم الله الرحمن الرحيم

Sudan University of Science and Technology

Faculty of Post Graduate Studies Scientific Research

Collage of Engineering

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Radar Targets Detection Under Complex Environment

كشف أهداف الرادار تحت بيئة معقدة

The Thesis Submitted in Partial Fulfillment For Requirements of the Degree of Master of science M.S.C. in Telecommunication Engineering

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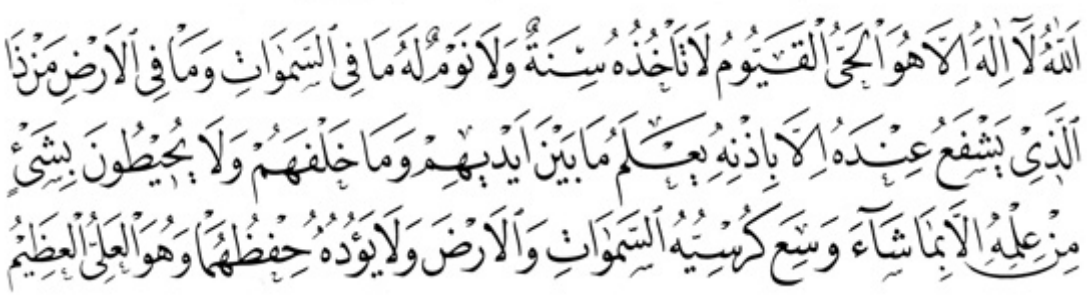
قال الله تعالى:


اللَّهُ لَا إِلَٰهَ إِلَّا هُوَ الْحَيُّ الْقَيُّومُ لَا تَأْخُذُهُ سِنَةٌ وَلَا نَوْمٌ لَهُ مَا فِي السَّمَاوَاتِ وَمَا فِي الْأَرْضِ مَنْ ذَا
الَّذِي يَشْفَعُ عِنْدَهُ إِلَّا بِإِذْنِهِ يَعْلَمُ مَا بَيْنَ أَيْدِيهِمْ وَمَا خَلْفَهُمْ وَلَا يُحِيطُونَ بِشَيْءٍ
مِنْ عِلْمِهِ إِلَّا بِمَا شَاءَ وَسِعَ كُرْسِيُّهُ السَّمَاوَاتِ وَالْأَرْضَ وَلَا يَئُودُهُ حِفْظُهُمَا وَهُوَ الْعَلِيُّ الْعَظِيمُ

صدق الله العظيم
سورة البقرة

To My Family…

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*I thank God (**ALLAH**) for giving me the endurance and perseverance to complete this work.*

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ABSTRACT

Models for radar detection targets under complex electromagnetic environment were established, including clutters and active electrical jamming. MTI filter based clutter rejection technique is presented. RADARs with fixed carrier frequency profile are vulnerable to jamming; Frequency agility is one of the best techniques used for anti jamming by changing the carrier frequency of the radar.

المستـــخلص

تم تأسيس نماذج لكشف أهداف الرادار تحت بيئة كهرومغناطيسية معقدة ؛ تشمل الاشارات الغير المرغوب فيها المرتدة عن التضاريس حول الرادار والاهداف الـثابته بالاضـافة للـضوضاء النـاتجه عـن التشويش الكهربائي.

تستند تقنية مؤشر الاهداف المتحركة على ترشيح الاهداف من الاشارات غير المـرغـوب فـيـها النـاتجه عـن التضـاريس والاهـداف الثـابـتة.

الرادارت التي تستخدم تردد حامل ثابت أكثر تعرضا للتشويش و تعتبر تقنية تغيير التردد هي واحدة من أفضل التقنيات المستخدمة لمكافحة التشويش عن طريق تغيير التـردد الحـامل للرادار.

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Abbreviation

CW	Continuous Wave
ECCM	Electronic counter-countermeasures
ECM	Electronic Countermeasures
EW	Electronic Warfare
EWR	Early Warning Radars
FA	Frequency Agility
HF	High Frequency
IPP	Inter Pulse Period
KB	Kilo byte
MTI	Moving-Target Indication
MMW	Milli-Meter Wave
PR	Pulsed Radars
PRF	Pulse Repetition Frequency
PPI	plan position indicator
PRT	pulse-repetition time
RADAR	Radio Detection And Ranging

RF	Radio Frequency
VHF	Very High Frequency
UHF	Ultra High Frequency

List of Symbol

R	The Target Range
ΔT	Time Delay
C	The Speed of Light
P_{tx}	The Peak Power Transmitted by the Radar
P_{rx}	The Power Returned to The Radar from a Target
L	Sum of the all Loss Factors of The Radar
G	The Antenna Gain of The Radar
σ_t	Radar Cross Section
K	Temperature
T	Bandwidth
B	Boltzmann's Constant