الآيـــــــــــة

قال تعالى :

بسم الله الرحمن الرحيم

(إِنَّ فِي خَلْقِ السَّمَوَاتِ وَالأَرْضِ وَاخْتِلافِ اللَّيْلِ وَالنَّهَارِ وَالْفُلْكِ الَّتِي تَجْرِي فِي الْبَحْرِ بِمَا يَنفَعُ النَّاسَ وَمَا أَنزَلَ اللَّهُ مِنْ السَّمَاءِ مِنْ مَاءٍ فَأَحْيَا بِهِ الأَرْضَ بَعْدَ مَوْتِهَا وَبَثَّ فِيهَا مِنْ كُلِّ دَابَّةٍ وَتَصْرِيفِ الرِّيَاحِ وَالسَّحَابِ الْمُسَخَّرِ بَيْنَ السَّمَاءِ وَالأَرْضِ لآيَاتٍ لِقَوْمٍ يَعْقِلُون (164))

سورة الْبَقَرة

Dedication

To

Endless love

Our mothers

To

The man who teach me to be man

Our fathers

To

All classmate in Sudan University of Sciences and Technology

To

Every one interesting to spend priceless & trisagion to favor verily

To

Every one educated me to attaining knowledge

To

My second family school of electrical &nuclear engineering

to

Our teacher & our colleagues

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ABSTRACT

Wind energy, as an alternative to fossil fuels, is plentiful, renewable, widely distributed, clean, and produces no greenhouse gas emissions during operation. Wind electrical generation systems are the most cost competitive of all the environmentally clean and safe renewable energy sources in the world.

Wind system uses squirrel cage induction generators and fed power to utility grids or autonomous loads.

The system requires external reactive power source to support grid voltage and it can keep the output power at the nominal level by pitch control.

المستخلص

طاقة الرياح كبديل للوقود الأحفوري , أكثر وفرة , متجددة, منتشرة ,نظيفة, وليس بها أي أنبعاثات للغازات إثناء العمل , وتعتبر طاقة الرياح اقل تكلفة مقارنة مع جميع الطاقات المتجددة النظيفة في العالم. في هذا البحث تمت دراسة أنظمة الرياح التي تستخدم المولد الحثي ذو القفص السنجابي بحيث تعمل على أمداد الطاقة الكهربائية للشبكة أو مجموعة من الأحمال الكهربائية .

ولقد وجدنا أن هذا النظام يحتاج لمصدر قدرة ردية من اجل أمداد الشبكة بالطاقة , وبحاجة للتحكم في مساحة السطح المعرض للرياح من اجل الحفاظ علي طاقه الخرج في الحدود المسموح بها.

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LIST OF ABBREVIATIONS

SCIG	Squirrel-Cage Induction Generator
DFIG	Doubly-Fed Induction Generator
PV	Photovoltaic
DC	Direct current
kW h	kilowatt hours
HDR	Hot dry rock technology
OTEC	Ocean thermal energy conversion
H	Hydrogen
He	Helium
WTGs	wind turbine generation
HA-WTGs	Horizontal Axis WTGs
VA-WTGs	Vertical Axis WTGs
SRC	Specified Rated capacity
TSR	Tip speed ratio
WES	Wind energy system
FRT	Faults Ride Through
p.u	Per unit
Kva	kilowatt amber
VA	Volte amber

LIST OF SYMOBLES

ρ	Air density, kg/m^3
A	Cross sectional area of wind parse, m^2.
V	The wind speed, m/sec.
	power contained in wind (in watts)
	the wind velocity without rotor interference
	power coefficient
	Tip speed ratio
	rotational speed (rpm)
	radius of the swept area (meter)
	Mechanical Power transmitted to the shaft is
	Mechanical Torque
	Tidal power
g	Speedy gravity
	Rotor magnetic field
	Rotor voltage at locked-rotor conditions
	Slip
	Rotor resistance
	Rotor reactance
	Rotor inductance
	Frequency of the voltage and current in the rotor
	Blocked-rotor reactance
	Rotor current
	Equivalent rotor impedance
	Primary voltage
	Secondary voltage

	turns ratio of an induction motor
	turns ratio
	mass of the wind
	wind speed
	kinetic energy
	Power wind
B	blade pitch angle