

بسم الله الرحمن الرحيم

قال تعالى :- (قالوا سبحانك لا علم لنا إلا ما علمتنا إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ .)

صدق الله العظيم

الآلية ٣٢ - سورة البقرة

ORIGINALITY DECLARATION

The author declares that the thesis submitted is research works and results obtained by the author under the guidance of his supervisor. As far as the author known, this thesis does not contain any research result published or written by other individual or group unless the content has been marked references. Any individual and group contributing to this thesis have been indicated in the thesis clearly. The author is fully aware of the legal consequences of this statement to me.

Thesis Author Signature:

Date: 10 Aug. 2014

Dedication

To whom she dressed me the life,

Mother.

To whom he gave me a beautiful pain,

Father.

The suns that burn to light for us,

Teachers.

To whom I share with them the sorrow and sweet,

Friends.

Whenever commit a fault we will find forgiveness,

Brothers.

To whom I stoop for them,

To all.

Acknowledgement

My thanks firstly go to the almighty God without whose help none of this could have been done.

And True thanks to Dr. Mohammed Osman Hassan his effective contribution in success of this research and the preparation of the qualified of future engineers.

Also i would like to extend our thanks to my faculty [faculty of Engineering and Technical Studies] for helping me in bringing this thesis to success.

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Abstract

Security assessment is a term used to describe the process of ensuring system operating security. This thesis discussed the security of the power system for the purpose of maintaining the continuity of power flow from the station to the consumer within rated values whatever the circumstances of generation station. The main objective of this thesis is to study the security assessment indices of power systems in general, and then the study is to investigate the security assessment of the national grid of Sudan as case study.

In this thesis, performance indices used in the contingency selection of the system were discussed, and applied to the national grid of Sudan system under different scenarios. According to these scenarios the most risky case has been discovered. The national grid of Sudan which consists of 191-bus system has been taken as case study. By comparison between the normal load flow and the load flow after the outage of some transmission line, it has been found that the outage of the main transmission line between Khartoum and Merowe leads to total blackout. From this thesis it can be concluded that ETAP software is of high efficiency, simple, and can be run by any personal computer. Also it has been considered the best option to solve the problem in question.

مستخلص

التقييم الآمن هو مصطلح يستخدم لوصف عملية ضمان أنظمة التشغيل. ناقشت هذه الأطروحة
أمن أنظمة القدرة الكهربائية لغرض الحفاظ على إستمرارية سريان القدرة من المحطة الى
المستهلك ضمن قيمة مقدمة مهما كانت ظروف تشغيل محطات التوليد. الهدف الرئيسي من هذه
الأطروحة هو دارسة مؤشرات التقييم الآمن لانظمة القدرة الكهربائية بشكل عام، ثم تنفيذ التقييم
الآمن على شبكة السودان القومية كدراسة حالة.

في هذه الأطروحة تمت مناقشة بعض مؤشرات الأداء المستخدمة في اختيار الادهات
للانظمة، وتطبيقاتها على نظام شبكة السودان القومية بأخذ سيناريوهات مختلفة. وفقاً لهذه
السيناريوهات تم إكتشاف الحدث الاكثر خطورة تحتوي شبكة السودان القومية على ١٩١ موصل
عمومي. تمت المقارنة بين سريان القدرة الطبيعي وسريان القدرة بعد خروج بعض خطوط
النقل، من هذه الدراسة وجد أن خروج خط النقل الرئيسي بين الخرطوم ومرwoي يؤدي الى
الاظلام التام. كما خلصت الدراسة الى أن برنامج ETAP ذا كفاءة عالية ويحتاج لحسابات
بساطة و مباشرة ويمكن استخدامه بسهولة في اي حاسب شخصي، و لذلك يعتبر الخيار الأمثل
لحل المشكلة المطروحة.

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List of abbreviation

AFR.....	afraa
ATB.....	atbra
BAG.....	bageer
BNT.....	bant
DEB.....	aldbaa
DON.....	dongla
FAO.....	alfaw
FAR.....	alfaroog
FRZ.....	free zone
GAD.....	giad
GAM.....	algmouea
GAR.....	garee
GDF.....	algdaref
GER.....	algerba
HAG.....	alhag abdala
HAS.....	alhasahisa
HLF.....	hlfaa
HWT.....	alhawataa
IBA.....	eid babeker
IZB.....	izba
IZG.....	izergab
JAS.....	jabel awlya
KAB.....	alkabashe
KHN.....	khartom north
KLX.....	kiloo ashraa
KSL.....	kaslaa
KUK.....	kokoo
LOM.....	local market
MAR.....	marengan
MHD.....	almhadiyaa
MRK.....	almrkyaat
MUG.....	almogran
MWP.....	marowee
OMD.....	omdorman
POR.....	portsudan
RBK.....	rbak
RNK.....	alrank
ROS.....	alroseres
SNJ.....	sennar
TND.....	tandalti
UMR.....	um roaba

OBD.....	alobeed
SCADA	Supervisory control and data acquisition systems
US	Unite state
ETAP	Computer programming soft ware
LV.....	Low voltage
HV.....	High voltage