الآيـة

قـال تـعـالـى :

﴿ ويسألونك عن الروح قل الروح من أمر ربي وما

أوتيتم من العلم إلا قليلا ﴾

سـورة الإسراء

آية (85)

Dedication

To our mothers who never stop loving us...

To our fathers who never stop believing in us…

To everyone who taught us the meaning of invention and hope …

To all our teachers…

To everyone made us able to complete this stage of our life …

To all our friends…

Thanks…

ACKNOWLEDGMENTS

Thank God for the wisdom and perseverance that he has been bestowed upon us during this research project, and indeed, throughout our life, we can do everything through him who gives us strength.

Dr. Giddani Osman Addalan. His support, guidance, advice throughout the research project, as well as his pain-staking effort in proof reading the drafts, is greatly appreciated. Indeed, without his guidance, we would not be able to put the topic together.

Last but not least, we would like to thank our parents for their unconditional support, both financially and emotionally throughout our degree.

Abstract

Energy losses occur in the process of supplying electricity to the consumer due to technical and commercial losses. The overall aim of this research is reducing losses in Sudanese National Grid using NEPLAN software.

The techniques has been used are Adding small generation and Unified power flow controller (UPFC).The optimal location for generation was MARNGAN and the losses has been reduced to less than its value at base case.

The Line stability index has been used to detect the optimal location for UPFC which was the line connecting between MARNGAN and HASAHESA.

المستخلص

مفاقيد القدرة تحدث خلال عملية إمداد الطاقة الكهربائية للمستهلك وذلك بسبب المفاقيد التقنية والاقتصادية
الهدف الرئيسي من هذا البحث هو تقليل المفاقيد في الشبكة القومية السودانية بمساعدة برنامج
NEPLAN .
التقنيات التي استخدمت هي اضافه توليد بسعه قليله و متحكمة سريان القدرة الموزعة (UPFC) .
الموقع الامثل للتوليد وجد في مارينجان وقد قلت المفاقيد الى اقل من نصف قيمتها في الحالة العادية , تم
استخدام مؤشر استقرارية الخطوط لتحديد الموقع الامثل لل(UPFC) وقد وجد ان الموقع الامثل يقع بين
مارينجان والحصاحيصا .

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List of abbreviations

AC	Alternating current
DC	Direct current
FACTS	Flexible AC transmission system
UPFC	Unified power flow controller
DG	Distributed generator
P	Active power ,Mw
Q	Reactive power ,Mvar
Lmn	Line stability index
θ	Line impedance angle
δs	Phase angle at the sending end
δr	Phase angle at the receiving end
Vs	Sending voltage ,V
Vr	Receiving voltage, V
S	Apparent power ,VA
Z	Line impedance ,Ω
X	Line reactance ,Ω
NTL	Non-technical losses
STATCOM	Static Synchronous Compensator.
TCSC	Thyristor Controlled series capacitor
SVC	Static VAR Compensators.
LT	Line transmission
PF	Power factor
SSSC	Static Synchronous Series Compensator.