الآية

﴿ ... يَرَى اللَّهُ عَمَلَكُمْ وَرَسُولُهُ وَالْمُؤْمِنُونَ

... وَالْغَيْبِ وَالشَّهَادَةِ فَيُنَبِّئُكُمْ بِمَا كُنْتُمْ

تَعْمَلُونَ ﴾

التوبة (105)

DEDICATION

To

My Dearest Parents who are the part of my soul and whose love, affection and confidence enabled me to achieve this goal.

TO

my brothers Khidir, Yousif and Mohammed and to my sister Alzahraa for their help and patience, for every period I was away.

TO

the soul of my grandmother (Fatima), may Allah forgive her and grant her his highest paradise (Ameen).

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Abstract

The Static VAR Compensator provides reactive power and voltage support to the transmission system by switching local SVC capacitors and controlled reactor. The SVCs are needed the most during network disturbances. At these occasions they may make the difference between a network collapse and successful continued operation, The basic task of the SVC fault clearance system is to detect a specified class of power system faults and abnormalities and to disconnect the associated item of plant from the rest of the power system, The fault clearance system shall perform with high reliability, speed, selectivity and sensitivity.

This thesis will focus on the control based over/under-current and thermal overload protection for the SVC and also on the relay-based protection included in the SVC installation will also be discussed.

The simulation will focus on applying different types of faults which may accrue in LOCALMARKET SVC substation and how they can be detected and cleared by the protection system of the SVC. The analysis is carried out using MATLAB SIMULINK software.

المستخلص

معوضات القدر ة الرد فعلية الساكنة تقوم بدعم نظام الجهد والقدرة الردفعلية بالنسبة لمنظومة نقل القدرة الكهربية. هذه المعوضات يجب توفرها في حالة حدوث مشكلة في منظومة القدرة الكهربية عند هذه اللحظات قد يمثل وجود هذه المعوضات الحد الفاصل بين استمرار واستقرارية النظام وبين الانهيار التام. المهمة الاساسية لمنظومة الحماية الكهربية لهذه الوحدات هي ان تقوم باكتشاف الاعطال داخل هذه المنظومات وعزل الاجزاء المتضررة عن بقية المنظومة. يجب ان يتصف نظام الحماية بالاعتمادية و الحساسية و الاستقرارية و السرعة عند فصل الاعطال.

في هذا البحث يتم التعرض لطرق حماية وحداتمعوضات القدر ة الرد فعلية الساكنة المبنية في منظومة التحكم و كذلك تلك المخصصة لحماية كل مكون من مكونات منظومةمعوضات القدر ة الرد فعلية.

نمذجة النظام التي سوف تتم بواسطة برنامج MATLAB SIMULINK ستوضح كيف ان لنظام الحماية القدرة علي ان يكتشف و ان يعزل عدد من الاعطال التي تم يمكن ان تحدث لمعوضات القدرة الردفعلية الساكنة الموجودة في محطة السوق المحلي التحويلية.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLE

LIST OF SYMBOLS

α	Thyristor firing angle
i	Current [A]
L	Inductance [H]
v	Voltage [V]
X	reactance of reactor
P	Active power [W]
Q	Reactive power [VAr]
S	Apparent power [VA]
ω	Synchronous speed
X	Reactance [Ω]
R	Resistance
R_s	stabilizing resistor
In	Rated CT Secondary Current
R_{ct}	CT resistance

R_l	Pilot wire resistance
87V	Voltage Differential protection

LIST OF ABBREVIATIONS

FACTS	Flexible Alternating Current Transmission System
SVC	Static Var Compensator
TCR	Thyristor Controlled Reactor
CT	Current Transformer
DC	Direct Current
AC	Alternating Current
CB	Circuit Breaker
FC-TCR	Fixed Capacitors & Thyristor Controlled Reactor
TSC-TCR	Thyristor Switched Capacitors & Thyristor Controlled Reactor
IDMT	Inverse Definite Minimum Time
SI	Standard Inverse
VI	Very Inverse
EI	Extremely Inverse
DT	Definite Time
TMS	Time Multiplayer Setting
I_s	relay setting current
TD	Time Dial setting
SCB	Shunt Capacitor Bank
MV	Mideum voltage
HV	High voltage
LV	Low voltage