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بسم الله الرحمن الرحيم

مركز الشبكات وتكنولوجيا المعلومات

قسم التوثيق الإلكتروني



Salwa Akl



جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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B18353

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OVERVOLTAGES IN POWER SYSTEMS

By

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(B. Sc.(1992) in Electrical Engineering)

Thesis Submitted in Partial Fulfillment of The Requirements For
The degree of Master (M.Sc.)

In

Electrical Engineering

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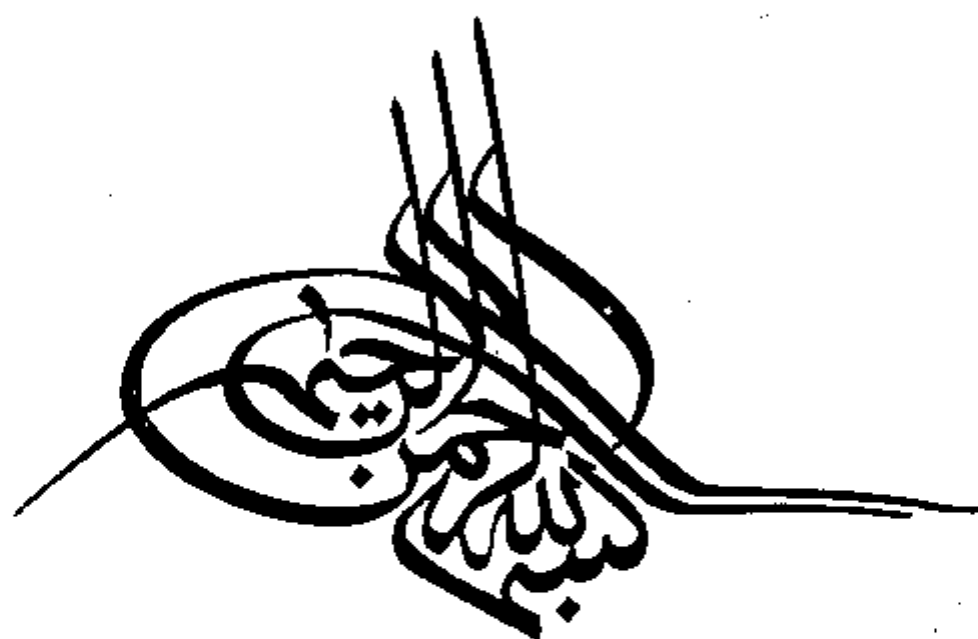
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1995





بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

وَأَشْرَأَ اللَّهُ عَلَىٰ نَفْسِكَ الْحَيَاتِ وَالْكَافَّةِ وَعَلَيْكَ

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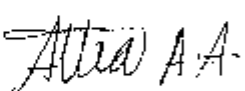

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Thesis Defence Date : 23-12-1995

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ABSTRACT

Study of overvoltages in power systems are important specially in Extra and Ultra High Voltage systems (EHV& UHV).The study in such systems are necessary for reliable design and economic operation .

Power systems are subjected to many forms of transient phenomena brought about essentially by sudden changes in the steady state values of voltages or currents.Such changes may be the result of atmospheric disturbances such as lighting or result from some operating conditions such as switching .These disturbances cause overvoltages surges which are different in their magnitude,shape and duration .Overvoltages are classified to three main types,transient,steady state,and resonance overvoltages.

The calculation of Transient phenomena in power systems is not simple .This is because that the power system itself consists of different elements whose characteristics vary widely .Some elements are distributed and/or lumped and may be mutually coupled, while others such as sources are linear and/or nonlinear.

This thesis studies resonance overvoltages in Egyptian EHV system (500 kV).Its causes and its effects on power system elements.The study suggested three solutions to avoid resonance overvoltages due to shunt reactors ,which are essential elements in high voltage networks.

The suggested solutions are :

- 1- The optimum capacity of reactors are less than 100 MVAR or greater than 200 MVAR.
- 2- The optimum location of the reactors is at the substation bus bar.
- 3- new technique which this thesis presents by setting operation policies between the reactor and it's line circuit breakers.

The study also carried out for the future Egyptian EHV system to check the reasonability of the suggested solutions

This thesis studies also the steady state overvoltages in Egyptian EHV system due to loading conditions and Ferranti effects.

The study presents an overvoltages automatics setting to protect the system against this type of overvoltages.

The study also carried out for the future Egyptian EHV system to check the reasonability of the suggested setting.

The study show that the suggested setting is satisfied for the existing and the future system.

Electro-Magnetic Transient Program (EMTP) is used for such studies. EMTP is a widely used program around all the world to simulate the electric power networks .It solves the algebraic, ordinary ,and partial differential equations that are associated with the interconnection of the different power system elements.

ACKNOWLEDGMENT

It is through God's grace that the present work could be fulfilled.

I wish to express my sincere gratitude to Prof. ***Dr. Attia Abd El-Ghaney***, Electrical power and Machines Department, *Mansoura University*, ***Dr. Kamel Yassin***, General Manager of Operations Planning Department in the National Energy Control Center, EEA, ***Dr. El-Hosaini Abd-Raboh***, Electrical Power and Machines Department, Faculty of Engineering, *Mansoura University* for their constructive supervision, generous assistance and kind help.

My best thanks to all staff members of Electrical Power and Machines Department, *Mansoura University*, for their continuous help during the course of this work.

My best thanks to Prof ***Dr. Fathi Abd El-Kader***, Electric Power and Machines Department, Faculty of Engineering Shebeen, *Monofia University*, Prof ***Dr. Ing. Fathi Youssef***, electric power and Machines Department, *Mansoura University*, ***Dr. Sobhy Abd El-Kader***, Electrical Power and Machines Department, *Mansoura University*, for their continuous encouragement and their great support.

My best thanks to my friends ***Eng. Mohamed Samy***, ***Eng. Ahmad Hasan***, ***Eng. Mohamed Rashed***, and ***Eng. Khalid Abd El-Moemen*** for their continuous help during the course of this work.

My best thanks to all staff of operation planning department in the National Energy Control Center specially my friends ***Eng. Hazem Hanafi***, and ***Eng. Hesham Abd El-Hassib*** for their continuous help during the course of this work.

Last not last, special thanks to my family, for her great encouragement and support.

CONTENTS

CHAPTER 1 : INTRODUCTION

1.1 Historical Back Ground.....	1
1.2 Objectives of the Present Thesis	3

CHAPTER 2 : OVERVOLTAGES IN POWER SYSTEMS

2.1 Introduction	7
2.2 Types Of Overvoltages	7
2.2.1 Transient Overvoltages.....	8
2.2.1.1 External overvoltages	8
2.2.1.2 Switching overvoltages.....	8
2.2.2 Steady State Overvoltages.....	13
2.2.3 Resonance Overvoltage.....	16
2.3 How To Control Overvoltages.....	17
1. Pre - Insertion Resistors	17
2. Phase - Controlled Closure.....	17
3. Drainage of Trapped Charges.....	17
4. Shunt Reactors.....	18

CHAPTER 3: METHODS OF ANALYSIS OF

ELECTROMAGNETIC TRANSIENTS

3.1 Fourier Transformation Method.....	20
3.2 Modal Analysis Of A Uniform N-Phase Line	21
3.3 Lattice - Diagram Method.....	22
3.4 Z-Transform Method.....	23
3.5 Electro Magnetic Transients Program (EMTP)	24
3.5.1 The EMTP Procedure.....	24
3.5.2 Modeling of System Elements in EMTP	34

CHAPTER 4 : RESONANCE OVERVOLTAGES IN EXTRA HIGH VOLTAGE (EHV) NETWORKS

4.1 Introduction	36
4.2 Resonance due to switching of compensated transmission line.....	37
4.3 Resonance Effects	42
4.3.1 Time Domain (V, t).....	42
4.3.2 Frequency Domain (V, f).....	43
4.4 Resonance overvoltages in the Egyptian EHV network.....	44
4.4.1 Egyptian EHV Network	44
4.4.2 Algorithm of Simulation	49
4.4.3 Load Flow of the Case Study	49
4.4.5 Case Study Results	51
4.5 How To Avoid Resonance.....	54
1. Changing the Reactor Capacity(MVAR).....	54
2. Relocating the Reactor	54
3. Setting an Operation Policies Between the Reactor and Its Line C.B's.	55
4.6 Resonance Overvoltage In The Future Egyptian EHV Network.....	61
4.6.1 Network Description	61
4.6.2 Case Study Load Flow	61
4.6.3 Case Study Results.....	64
4.6.4 How to Avoid Resonance in New Egyptian EHV System	65
4.7 Analysis Of The Results	69

CHAPTER 5 : OVERVOLTAGE AUTOMATICS SETTING

5.1 Egyptian Extra high Voltage Network.....	71
5.2 Operation Condition Automatics in Egyptian EHV System	71
5.3 Steady State Overvoltage Due to Loading Conditions	74
5.3.1 Maximum Evening Loading Case	74
5.3.2 Maximum Day loading Case	76
5.3.3 Minimum Day Loading Case.....	78

5.4 Ferranti Effect Overvoltages.....	80
5.4.1 Forward Direction Overvoltages Caes	80
5.4.2 Backward Direction Overvoltages Caes	87
5.4.3 Overvoltage Automatics	94
5.4.4 Overvoltage Automatics Setting for Egyptian EHV System.....	96
5.5 Reasonability of Settings.....	100
5.5.1 For Maximum Evening Condition.....	100
5.5.2 For Maximum Day Condition.....	100
5.5.3 For Minimum Day Condition.....	101
5.6 Analysis of the Case Study Results	104
5.7 Overvoltage Automatics for the Future Egyptian EHV Network.....	105
5.7.1 Network Description	105
5.7.2 Steady State Overvoltages due to Loading Conditions	105
5.7.3 Steady State Overvoltage due to Ferranti Effect.....	109
5.7.4 Overvoltage Automatics Setting for The Future Egyptian EHV System	116
5.8 Reasonability of Setting.....	122
 CHAPTER 6 : CONCLUSION AND RECOMMENDATIONS	
6.1 Conclusions	125
I. Resonance Overvoltages in EHV Systems	125
II. Steady State Overvoltages in EHV Systems.....	125
6.2 Recommendations.....	126
 REFERENCES	127
 APPENDIX.....	131

CHAPTER

(1)