الآية

بسم الله الرحمن الرحيم

اقْرَأْ بِاسْمِ رَبِّكَ الَّذِي خَلَقَ ﴿١﴾ خَلَقَ الْإِنسَانَ مِنْ عَلَقٍ ﴿٢﴾ اقْرَأْ وَرَبُّكَ
الْأَكْرَمُ ﴿٣﴾ الَّذِي عَلَّمَ بِالْقَلَمِ ﴿٤﴾ عَلَّمَ الْإِنسَانَ مَا لَمْ يَعْلَمْ ﴿٥﴾

صدق الله العظيم

سورة العلق من الآية (1-5)

Dedication

To my family

To my father

To my mother

And my friends

ACKNOWLEDGEMENTS

Firstly, I would like to express my gratitude and appreciation to mercifully God (Allah).

Also, I would like to express appreciation to my supervisor, Dr. Giddani Osman Addlan, for his useful guidance, keen interest, efforts and help at any time.

I would like to express my thanks also to University of Nyala for giving me this scholarship.

المستخلص:

خطوط نقل الجهد العالي تصمم لنقل كمية كبيرة من القدرة من مكان لأخر. و البيئة المحيطة هي السبب الرئيسي لحدوث الاعطال في خطوط النقل. الاعطال في خطوط نقل الجهد العالي تؤثر في استقرارية نظام القدرة ,والذي بدوره يؤدي أحيانا الي تلف دائم في الاجهزة . المشكلة الرئيسية في حماية خطوط نقل الجهد العالي هو عدم ضمان فصل العطل سريعا. في هذا البحث تم عمل مقترح لحل مشكلة كشف العيب والفصل سريعا باستخدام مرحل عددي مستندة علي الموجة المسافرة.

جهد و تيار الموجات المسافرة يولد عندما يحدث عطل في خط النقل.والمعلومات حول العطل يمكن الحصول عليها بتحليل الموجة المسافرة.في هذه الاطروحة تم ايجاد مركبات الموجة المسافرة في شكل موجات امامية وخلفية من مركبات الجهد والتيار بعد حدوث العطل.تقنية الموجة المسافرة مستندة علي معالجة الاشارة التماثلية مقترحة في هذه الاطروحة بالإضافة الي تقنية عددية تميز وتكشف العطل باستخدام معلومات استندت علي هذه الموجات. التقنية نفذت في MATLABSIMULINK.هذه الاطروحة ناقشت بعض حالات الاعطال.

اداء التقنية العددية باستخدام الموجات المسافرة لحماية خطوط النقل اكدت انها مقنعة . بالإضافة إلي انها تعطي حماية سريعة ودقيقة.

Abstract:

High Voltage transmission lines are designed to transfer large amount of power from one location to another. The length exposed to the environment is a major reason for occurrence of faults on the lines. A fault on a high voltage transmission line affects the stability of the overall power system, which sometimes leads to permanent damage of the equipment. The Major problem of tripping signal of a relay based on steady state component does not warranty faster tripping schemes for protection of high voltage transmission lines. Proposed work has made an attempt to find solution to the problem of fault detection and faster tripping using numerical relay based on travelling wave.

Voltage and current traveling waves are generated when a fault occurs on the transmission line. The Information about the fault can be obtained by analyzing the traveling waves. This Thesis has made an attempt to obtain travelling waves components in the form of forward wave and backward waves from post fault components of voltage and current. The traveling wave techniques, which are based on analog signal processing, proposed in this thesis in addition to numeric techniques identify and locate the fault by using the information contained in the waves. The techniques are implemented in MATLABSIMULINK. Some cases of the fault are discussed in the thesis.

The performance of the numeric technique for protecting HV transmission lines using traveling waves is confirmed to be satisfactory. The proposed technique provide protection at speed and accurate.

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List of Abbreviations

HV	High Voltage
VT	Voltage Transformer
CT	Current Transformer
A/D	Analog to Digital Converter
S&H	Sample and Hold
CASE	Computer Aided Software Engineering
ROM	Read-Only Memory
RAM	Random Access Memory
E-PROM	Electrically Erasable Programmable Read Only Memory

List of Symbols

α	Attenuation constant [Nepers/m]
V	Voltage [Volt]
I	Current [Ampere]
Y	Admittance [ʊ]
C	Capacitance [F]
Z_c	Characteristic impedance [Ω]
Z_0	Surge impedance [Ω]
G	Leakage conductance [ʊ]
φ	Electric flux [A.s]
L	Inductance [H]
ψ	Magnetic flux [Wb]
v	Propagation speed [km/s]
γ	Propagation constant
R	Resistance [Ω]
t	Time [s]
V_x	Voltage at fault point
I_x	Current at fault point
V^f	Forward voltage
I^f	Forward current
V^r	Reflected voltage
I^r	Reflected current
ρ_V	Voltage reflection factor
ρ_i	Current reflection factor