CHARACTERISTICS OF VOLTAGE SAGS IN POWER SYSTEMS

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APPROVAL AND DECLARATION SHEET

This project report titled Tunneling Characteristic of Voltage Sag in Power System was prepared and submitted by Mohd Faizal bin Amril (Matrix Number: 081090459) and has been found satisfactory in terms of scope, quality and presentation as partial fulfillment of the requirement for the Bachelor of Engineering (Electrical System) in Universiti Malaysia Perlis (UniMAP).

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DECLARATION SHEET

I hereby declare that my Final Year Project Thesis is the result of my research work under supervision of Ir. Surya Hardi Amrin. All literature sources used for the writing of this thesis have been adequately referenced.

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CIRI-CIRI VOLTAN LENDUT PADA SISTEM KUASA

ABSTRAK

Kejatuhan voltan diklasifikasikan sebagai voltan purata punca kuasa dua yang berlaku dalam masa yang singkat ketika gangguan elektrik yang menyebabkan peralatan pengguna dan beban pada bekalan kuasa tidak berfungsi sepenuhnya dan juga dikenali sebagai faktor utama masalah gangguan bekalan kuasa. Walaubagaimanapun, tesis ini menyelidiki gangguan yang berlaku yang disebabkan oleh litar pintas atau kerosakan pada talian penghantaran tiga fasa. Tesis ini juga membandingkan perbezaan kejatuhan voltan pada setiap terminal Bas untuk sistem tiga fasa dimana perbezaan kejatuhan voltan adalah disebabkan oleh pengaruh sambungan pengubah dan juga disebabkan jenis kerosakan yang berlaku. Simulasi telah dijalankan menggunakan perisian PSCAD dimana ia berdasarkan pada beberapa tatarajah yang telah di modelkan. Sistem yang digunakan dalam tesis ini adalah sistem talian penghantaran dua Bas. Keputusan simulasi menunjukkan talian tiga fasa mengalami kejatuhan voltan yang rendah pada terminal Bas yang ke dua dibandingkan dengan terminal Bas yang pertama disebabkan oleh litar pintas dua fasa ke bumi. Ini adalah bergantung pada keadaan pengubah yang digunakan pada litar samada pengubah penaik atau pengubah penurun. Litar pintas atau kerosakan yang berlaku pada terminal Bas ke dua menyebabkan berlaku penurunan voltan yang dalam pada terminal motor aruhan dan kenaikkan arus pada terminal motor tersebut.

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CHARACTERISTICS OF VOLTAGE SAGS IN POWER SYSTEMS

ABSTRACT

Voltage sags are the short durations in root-mean-square (RMS) rated AC voltage occur during faults may cause miss-operations to the customer's equipment and loads of power system and recognized as the most important power quality problem. However, this thesis investigates the sag event which is caused by a short circuit or fault to the three-phase transmission line. This thesis also presents the comparisons between voltage reductions at two Bus terminals for three-phase systems where the difference in voltage drop or reduction is caused by the transformer connection and also because of the type of fault caused. Simulations were carried out using PSCAD software which it is based on a number of configurations which has been modeled. The systems used in this thesis are two Bus transmission line systems. Simulation results indicate that three-phase line has a low voltage reduction at second bus terminal compared with the first Bus terminal due to the two-phase to ground fault. This is dependent on the transformer used in the circuit either step-up or step-down transformer. Short circuit or fault occurring on the second Bus terminal causing of the voltage decreased in the terminal of induction motor and increased induction motor current at the motor terminal.

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LIST OF SYMBOLS, ABBREVIATIONS OR NOMENCLATURE

A	Ampere
EMTDC	Electromagnetic Transient Program with DC Analysis
Hz	Hertz
IEEE	Institute of Electrical and Electronics Engineers
J	Inertia of the motor, kg.m^2
$J\frac{d\omega_m}{dt}$	Torque Dynamic-present during speed transient
kV	kilovolt
K	Torque constant in V/A-rad/s
L	Inductor
MVA	Megavolt ampere
MVAR	Mega volt amps reactive
MW	Megawatt
p.u.	per unit
PCC	Point of Common Coupling
PSCAD	Power System Aided Design
RMS	Root Mean Square
R	Resistance
s	second
TNB	Tenaga Nasional Berhad
T_e	Electrical torque
T_L	Load torque, N.m
T.Line	Transmission Line
ω_m	The instantaneous angular velocity of the motor shaft, rad/s
ω_s	Syncronous Angle Speed, rad/s
V	Voltage
X	Reactance
X/R	Transformer

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