PENYELIDIKAN PRESTASI LAMPAU BALIK KILAT UNTUK TALIAN PENG-HANTARAN 275/132 kV DENGAN MENGGUNAKAN ATP-EMTP

ABSTRAK

Panahan kilat langsung ke menara talian penghantaran atau talian pelindung boleh mengakibatkan pecahtebat disebabkan oleh fenomena lampau balik kilat. Fenomena ini adalah disebabkan oleh panahan kilat tersebut boleh menyebabkan peningkatan nilai voltan sepanjang talian penghantaran. Jika nilai voltan tersebut menyamai atau melebihi nilai kritikal voltan lampau untuk penebat, kerosakan bahan penebat di talian akan berlaku. Nilai tinggi voltan lampau yang terhasil sepanjang talian yang terus menghala ke pencawang elektrik boleh memberi kesan buruk kepada peralatan yang dihubungkan ke talian penghantaran seperti pengubah, pemutus litar dan lain-lain. Oleh itu, penyelidikan prestasi lampau balik kilat untuk talian penghantaran 275/132 kV harus dilaksanakan dengan menggunakan ATP-EMTP. ATP adalah sistem program universal untuk menjalani simulasi digit untuk fenomena fana bagi elektromagnetik mahupun sifat elektromekanikal. Oleh yang demikian, demonstrasi masalah yang wujud mengenai sistem penghantaran elektrik boleh dilakukan dengan menggunakan perisian ini dan secara tidak langsung, ia dapat membantu dalam menyelesaikan masalah tersebut. Rintangan tanah di tapak menara penghantaran dan amplitud arus panahan diambil kira dalam penyelidikan ini.

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STUDY OF LIGHTNING BACKFLASHOVER PERFORMANCE FOR 275/ 132 kV TRANSMISSION LINE BY USING ATP-EMTP

ABSTRACT

Direct lightning strokes to overhead transmission line towers or to shield wires may cause line insulation breakdown, due to the back-flashover phenomenon which the stroke builds up the voltages across the line insulation and if these voltages equal or exceed the line critical flashover voltage(CFO). Over-voltages which occur on the lines and travel toward the substation can cause damage, particularly to expensive equipment such as transformers, circuit breakers and so on. Thus, the study of lightning back-flashover performance for 275/ 132 kV Transmission Line has to be made by using ATP-EMTP (The Electromagnetic Transients Program). ATP (alternative transients program) is a universal program system for digital simulation of transient phenomena of electromagnetic as well as electromechanical nature. Demonstration of existed problems in power system can be made in this software and thus, help to solve the problem. Other aspects like tower grounding resistance and lightning current amplitude will be considered in this study as required.

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APPROVAL AND DECLARATION SHEET

This project report titled Study of Lightning Back-flashover performance for 275/ 132kV Transmission Line by using ATP-EMTP was prepared and submitted by Kiu Ling Zee (Matrix Number: 071090279) 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 Engineering) in Universiti Malaysia Perlis (UniMAP).

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Checked and Approved by

_____

(NOOR SHAHIDA JAMOSHID)
Project Supervisor

School of Electrical System Engineering
Universiti Malaysia Perlis

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LIST OF SYMBOLS

A	Ampere
cm	centi-meter
ft	feet
H	Henry
Hz	Hertz
I_p	peak current
I_{prop}	Propagation length
kA	kilo-Ampere
kV	kilo- Volt
kWh	kilo-Watt per hour
m	meter
mm	millimeter
ms	mili-second
pF	piko-Farad
V	Volt
Z_t	surge impedance
µs	micro-second
Ω	Ohm
℃	degree Celcius

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LIST OF ABBREVIATIONS

ATP	Alternative Transient Program
CIGRE	International Conference on Large High Voltage Electric System
EHV	Electric High Voltage
EMTP	Electromagnetic Transient Program
IEC	International Electro-Technical Commission
IEEE	Institute of Electrical and Electronic Engineers
LCC	Line Constant Cable

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