ABSTRACT

Power transformers are key components for electrical energy transfer in a power system. Stability and security of transformer protection are important to system operation. Many maloperation cases of transformer differential protection are caused by inrush current problems. The phenomenon of transformer inrush current has been widely discussed in literature. Therefore, this research only discussed and analyzed inrush current problems to transformer differential protection.

To understand the inrush current problems on differential protection, transformer simulation models were presented using Matlab/Simulink. Differential relay simulations for internal and external faults, and relay performance during current transformer saturation were performed using PSCAD.

Recommendations were made on methods of reducing the blocking time of differential protection during inrush conditions.

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Lovingly dedicated to

my Mother,

You are the light of my life.

and

To the memory of my Father

Elias Tangenhamo Madzikanda

(1910-1989)

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LIST OF SYMBOLS AND ACRONYM

IEEE	The Institute of Electrical and Electronics Engineers
IEC	The Electric Power Research Institute
EMTP	The Electromagnetic Transient Program
Eskom	Electricity Supply Commission of South Africa
DC	Direct Current
CT	Current Transformer
MV	Medium Voltage
HV	High Voltage
EHV	Extra-High Voltage
kV	Kilovolts
kA	Kiloamperes
Hz	Hertz