THE 2017 4th INTERNATIONAL CONFERENCE
ON INFORMATION TECHNOLOGY, COMPUTER, AND ELECTRICAL ENGINEERING

ICITACEE 2017

OCTOBER 18 -19, 2017

The Wujil Resort and Conventions
Semarang, October 18 - 19, 2017

DEPARTMENT OF COMPUTER ENGINEERING
FACULTY OF ENGINEERING
DIPONEGORO UNIVERSITY

IEEE

Proceedings

The 2017 4th International Conference on Information Technology, Computer, and Electrical Engineering (ICITACEE)

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Foreword from General Chair

It is indeed a great pleasure for me to represent Universitas Diponegoro to welcome you to the 2017 International Conference on Information Technology, Computer, and Electrical Engineering (ICITACEE 2017). We set our goal to run this conference to be conducted annually one after another by two departments: Department of Electrical Engineering and Department of Computer Engineering. The main objective is to provide a platform for academician, researchers, engineers, and professionals from anywhere in the world to expose and exchange innovative ideas, disseminate and discuss their research updates in relation to the aspects of green technology.

This year, we have received 97 submissions, to be exact from various universities, research centers, as well as from industries from many countries. After careful reviews, we selected around 60 papers to be presented in this conference. This means 38% rejection rate. All the accepted and presented papers will be submitted for uploading to the IEEEXplore digital library.

We thank all authors and parties who have contributed and participated in presenting their works at this conference. We also gratefully acknowledge all reviewers for their respected knowledge from members of Conference Committee from Indonesia and abroad. Their efforts were crucial to the success of the conference. We are also blessed by the presence of three invited keynote speakers from different institutions which will address significant trends relating to green technology.

At last, we wish you all enjoying a two days discussions through this conference and spend time to feel the beauty of Ungaran city in one day city tour held after closing ceremony.

Very best regards,

Agung Budi Prasetijo, S.T., M.I.T., Ph.D

General Chair

Foreword from Head of Department

Department of Computer Engineering

Faculty of Engineering – Diponegoro University

Welcome to all the participants in The 4th International Conference on Information Technology, Computer, and Electrical Engineering (ICITACEE 2017) at Ungaran, Central Java, Republic of Indonesia. I would like to welcome keynote speakers from Universiti Teknologi Malaysia, Universiti Teknologi MARA, and Universitas Indonesia. This is the fourth conference held together by Computer Engineering Department and Electrical Engineering Department of Engineering Faculty, Universitas Diponegoro.

I would like to appreciate the vast work in this conference as a collaborative effort among Computer Engineering Department, Electrical Engineering Department, Universitas Diponegoro, IEEE Student Branch of Universitas Diponegoro, and IEEE Indonesia Section. I do hope that this conference will be a prestigious forum to communicate and sharing the findings and precious researches among experts in field of computer, information technology, and electrical engineering.

I would like to express my deep appreciation to Organizing Committee members, staffs, and students of both Computer Engineering and Electrical Engineering Department of Universitas Diponegoro for their effort and support. I wish that this event will give contribution to global development of Computer Engineering as well as to Electrical Engineering.

Dr. R. Rizal Isnanto, S.T., M.M., M.T.

Head of Department of Computer Engineering
Faculty of Engineering – Diponegoro University
Semarang – Indonesia

Foreword from The Dean

Faculty of Engineering – Diponegoro University

The 2017 4th International Conference on Information Technology, Computer, and Electrical Engineering (ICITACEE) is now held again as an annual conference organized by Department of Computer Diponegoro University.

The aims of the conference are to provide a forum for researchers, academicians, professionals, and students from various engineering fields and with cross-disciplinary working or interest in the development and design of information technology, computers, and electrical engineering to interact and disseminate the latest issues and researchers.

ICITACEE 2017 also invites the scholars and encourages the researchers to submit high quality manuscript and papers to this conference. It is also to share and exchange of ideas, thoughts and discussions on all aspect of development and design of information technology, computers, and electrical engineering to facilitate the formation of networks among participants of the conference for improving the quality and benefits of the research.

It is a great pleasure to welcome all the participants of this conference in Semarang. I also would like to welcome several members from Diponegoro University, University of Indonesia, Universiti Teknologi Malaysia (UTM), Universiti Teknologi MARA and so on.

I do hope that this conference will be a valuable forum for engineers and scientists to share their precious researches and this event will give significant contributions to the development of Information Technology, Computer, and Electrical Engineering and it will raise the awareness of scientific community members in bringing better life.

I hope that the conference will be stimulating and memorable for you. So, enjoy your time in Semarang

Ir. M. Agung Wibowo, MM, MSc, PhD
Dean of Faculty of Engineering
Diponegoro University
Semarang – Indonesia

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Design and Development of Data Acquisition for Leakage Current at Electrical Tracking Test

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***Abstract*—In electrical power systems, the insulator is the material that determines whether the electrical energy can be supplied or delivered to a place of excellent quality and does not harm the human and the environment around such high voltage electrical conductor devices. In testing leakage current in the laboratory, current and voltage changes in input and current changes and output voltages change very quickly, making it difficult to detect with the usual measuring device. For that required software to simulate the test.**

One method used to test the insulation resistance of the insulator material is the Inclined Plane Tracking (IPT) method. That is a method used to represent the leakage current on the surface of an insulation. The insulation and leakage resistance simulation in this test is performed by Multisim 14 software by simulating the insulation resistance with a potentiometer that changes resistance when a leak current occurs in the test. The resistance is increased step by step to know the parameters of current and voltage at the time of testing. In this simulation testing is done in stages, so it can be known Source Voltage, Input Voltage, Input Current, Leakage Current and Output Voltage.

Simulation using Multisim 14 software can represent insulation resistance, leakage current and output voltage that can be used to obtain replacement resistance (R_p), leakage current (Iout), output voltage (V_{out}), alternating current (I_{loss}) and replacement voltage (V_{loss}). Simulation Software Proteus can simulate data received in the form of analog into digital data. Further processed according to the data required.

Keywords— Inclined Plane Tracking (IPT), Leakage Current , Data Aquisition

I. INTRODUCTION

Electrical energy is a necessity that can be equated with basic needs. Electrical energy has penetrated almost all the wheels of human life. Business World, Industrial World, Educational Institutions and Households are the main users of electrical energy. Without electrical energy, the production process at the factory could not run. The business world and the industrial world as well as the offices will be overwhelmed [1].

The advancement of microcontroller system technology enables the creation of a tool that can translate the quantities of electricity it receives, into data that can be processed and displayed in accordance with the wishes of programmers using the software, whether appearing directly on PC computers, laptops or through Liquid Crystal Display (LCD), dot matrix, and others [2].

The presence of leakage current is an initial event that can lead to flashover on the surface of insulation material that eventually lead to failure. Therefore, it is necessary to measure and analyze the leakage current for different surface roughness to know the effect of surface roughness on the surface performance of the material in the polluted area. One method of measuring leakage current to represent the situation in the field is the Inclined-Plane Tracking (IPT) method set out in International Electrotechnical Commission (IEC) 587: 1986. The waveform, magnitude and THD of leakage current or Leakage Current (LC) flowing from a voltage source to the ground side can provide useful information for the diagnosis and illustrate the state of contaminated insulation material [3].

II. BASIC THEORY

A. Incline-Plane Tracking Method

Abdul Syakur, Hamzah Berahim, Tumiran, Rochmadi, 2013 examine: Testing is done using high voltage AC 50 Hz. The 3.5 kV test voltage is applied to the top electrode while the contaminants flow along the bottom side of the sample. In this test, method 1: used constant tracking voltage, and the time to start tracking is also determined. High voltage AC 50 Hz with a 3.5 kV voltage is generated from a 5 kVA test transformer. The 22 kΩ resistor is used to hold the current flowing on the surface of the material in case of discharge. The peristaltic pump is used to drain the contaminant solution. The schematic diagram of the test is shown in Fig. 1.

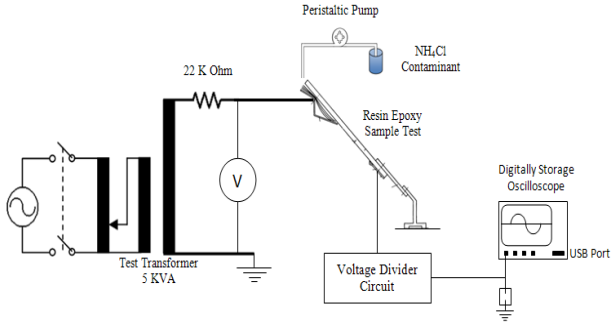


Fig. 1. Schematic diagram for testing

Electrical Tracking of epoxy resins coupled with silicone rubbers on various contaminants is investigated by analyzing leakage current and formation of Electrical Tracking with slanted tracker test method. The experimental results show that contaminants significantly affect the Electrical Tracking process. The effect of this contaminant can be analyzed by using current discharge parameters, ie discharge time and surface condition of the material. Based on the experimental results, found industrial contamination that occurs in Leak surface current leakage is 327.6 mA. It was also found that coastal contaminants (1420 µS / cm) showed the most severe damage to the surface of the test sample. Therefore special handling is required to test the samples based on the conditions of coastal contaminants and NH4Cl, so that the performance of the material can be improved, especially on the discharge of electricity [4].

Rohmat Nugroho, Abdul Syakur, Hermawan, 2009 examines: HDPE samples such as Fig. 2 have dimensions of 120 mm in length, 50 mm in width and 6 mm thick (IEC 587: 1984).

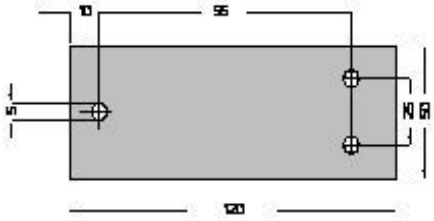


Fig. 2. Dimension of material used

The electrodes used are made of stainless with a thickness of 0.5 mm in accordance with IEC 587: 1984 standard. Can be seen in Fig.3

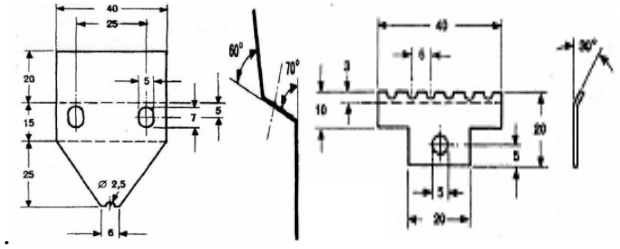


Fig. 3. Up and bottom electrod for testing

Installation of test and slope material, shown as Fig.4.

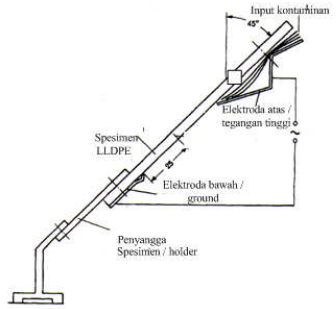


Fig. 4. Installation of electrod on the material

The conclusions can be obtained include :

1. The leakage current waveform that appears in the measurement is strongly influenced by the surface roughness conditions of the material and environmental conditions in the form of intensity of pollutant flow.
2. As a function of time the magnitude of the leak currents of the pulse shapes tends to oscillate while for the leaked current the distorted sine form tends to be constant [3].

B. Electrical Tracking and Leakage Current

Based on several analysis of isolator performance that has been done, found that the most severe damage to the isolator structure is the result of Electrical Tracking on the surface of the insulator. The process of Electrical Tracking is a typical phenomenon that occurs on the surface of the insulator due to the release of spots that arise on the surface induced. All are the result of surface wetting and the level of contamination. Once the tracking starts, the debit will be accelerated further and the path grows. Also so tracking happens. The insulation surface properties will be reduced and can not be recovered. Electrical Tracking on the surface of the material sample is caused by heating on the surface of the material in the event of a leakage current. The leakage current on the surface of the material occurs due to the contaminants that flow on the surface material. Different contaminants show various forms of Electrical Tracking. When the flashover of the voltage of air critical (Vc) is reached, the carbonization process occurs and the evaporation of water occurs. A permanent carbonization pathway is formed. This process is continuous and cumulative and eventually there is insulation damage. Surface discharge also occurs. Erosion on the surface of the sample is followed by the formation of filament pattern in which the resulting Electrical Tracking [4].

C. Surface Discharge

When the condition is dry, the surface of the insulator has a high impedance and very small capacitive leakage current in the form of discharge occurs on the surface. When the surface conditions of the wet insulator cause the flow of electrolyte solution due to contaminants on the surface of the insulator. The resistive leakage current will flow on the conductive layer along the surface of the insulator. This leakage current is not uniform because the conduction layer is not evenly distributed on the surface of the insulator. At this stage, the surface equivalent circuit of the insulator is represented by a resistance Rw. Flowing of currents with considerable density causes increased temperature. Heat generated from leakage current can cause dryband to form. Equivalent circuit after dryband is represented by parallel resistor impedance (Rd) and capacitor (Cd). [3].

The leakage current (LC), which is driven by the source voltage and collected at the tip of the ground isolator, provides a lot of useful information about the contamination of the contaminated state. The LC analysis is investigated based on the LC waveform and the frequency spectrum characteristics.

It was found that the magnitude and content of LC harmonics, and discharge duration differ significantly during the test section where no visible degradation, as compared with its values at visible degradation onset. These findings can be used to detect early failure of high-voltage devices for outdoor insulation. When the insulator is wet, the resistive LC current flows, which is generally a lot of orders of magnitude higher than the capacitive current in the case of a dry insulator. LC produces a non-uniform heating of the contamination layer due to nonuniform resistivity of the conduction film. This eventually causes the dried band to form on the narrow part of the isolator where the LC surface density is highest. LC resistive insulator is then reduced or may even be lost due to high resistance of dry tape. Distribution of tension along the surface of contaminated wet insulators is not very uniform when dry bands are formed in series. Since almost all voltages applied in isolators appear in high resistive dry bands, this can result in air damage over dry bands. LCs along the isolator can be detected only when the power frequency energy voltage exceeds a certain positive or negative voltage threshold. LC becomes nonzero and follows the waveform of the power frequency wave as the energy voltage is above the threshold value. The release of electricity will cause high thermal spots developed on the root of the arc and thus lead to gradual erosion of the surface of the insulator. This repetitive discharge burns the surface of the insulator to create a carbonated area, and is called "surface tracking". Transition LC waveform, until flashover occurs grouped into different stages and there is a threshold where the flashover occurrence can be predicted. The possibility of flashover becoming higher when the quantity and harmonic content of the component stand out over a certain level [5].

D. Multisim

Multisim is an application software that serves to draw and simulate the behavior of electronic circuits both analog and digital. This software is developed by National Instrument Company engaged in the production of electronic components. Multisim is the development of electronic circuit simulation software previously known as Electronics Workbench. With this Multisim software, we can model the properties of analog and digital circuit parameters.

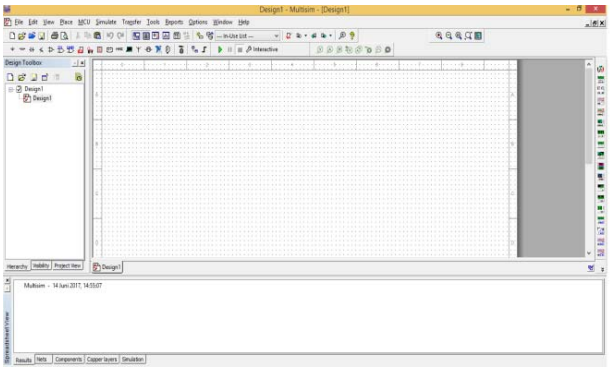


Fig. 5. Display Multisim Form

Multisim's ability is able to model various circuit designs, test a circuit with possible components, check the properties of the whole circuit by performing AC/DC or transient analysis. With the completeness of a number of existing components we can make a combination of almost unlimited circuit design [6]. Display the multisim form as shown in Fig.5.

E. Proteus Software

Proteus is a combination of ISIS and ARES programs. By merging these two programs the electronic circuit schematic can be designed and simulated and made into a PCB layout. ISIS stands for Intelligent Schematic Input System and is one of the integrated simulation programs with Proteus and is the main program. ISIS is designed as a medium for drawing electronic circuit schematics in accordance with international standards. In ISIS also included a program of ProSpice which is useful to simulate circuit schematic, so ISIS can be an interactive circuit simulator program. ProSpice is designed on the basis of the SPICE3F5 programming language standard, so it can simulate a mix of interactive analog and digital components known as Interactive Mixed Mode Circuit Simulator. ISIS can simulate various types of microprocessors and microcontrollers, including the AVR family microcontroller. It is expected that by using this simulation program, the design of microcontroller based circuit can be more easily done and reduce production cost and save time. ISIS comes with a compiler program, so it can compile source code files such as Assembly into Hex files so that later can be used by the actual microcontroller [7].

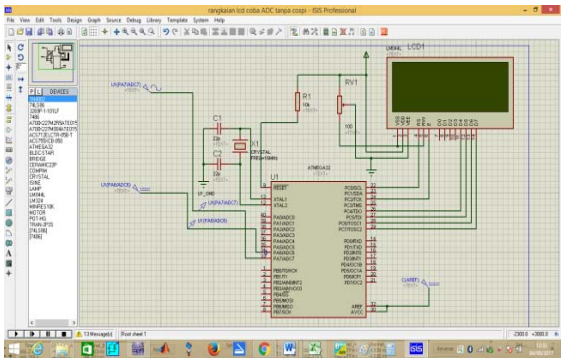


Fig. 6. Display of Proteus Form

III. SIMULATION METHODOLOGY

A. Multisim Simulation

The method used to simulate the LC is to construct a circuit like Figure IV.1. Install a high voltage test source ie 3.5 kV_{rms}, 22 kΩ front resistance. Ampere Meter and Volt Meter on the input side, 10Kohm Potentiometer is installed to present the change of resistance in insulation. Ampere Meter and Volt Meter on the output side. Added several resistors are arranged in series and parallel to secure the voltage to be inserted into the oscilloscope on the output side.

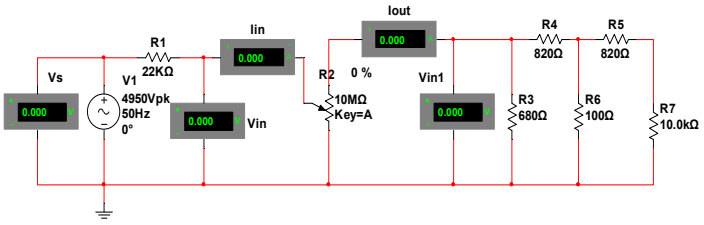


Fig. 7. LC test simulation circuit

Multisim provides many tools for measuring, the LC measurement method is used several tools include: 1 unit oscilloscope to see the input voltage and input current, Volt Meter to see the source voltage and input voltage on the insulation material installed before the Resistance. 1 ampere meter unit is needed to see the input current coming into insulation. After insulation resistance is installed 1 unit Amper meter to detect leakage current (LC) and 1 unit voltmeter to see the leakage voltage. 1 oscilloscope unit is required to see the LC wave and the leakage voltage that will be fed to the microcontroller for later on when data acquisition using microcontroller. The full range of simulated leakage current measurements can be seen in Fig. 8

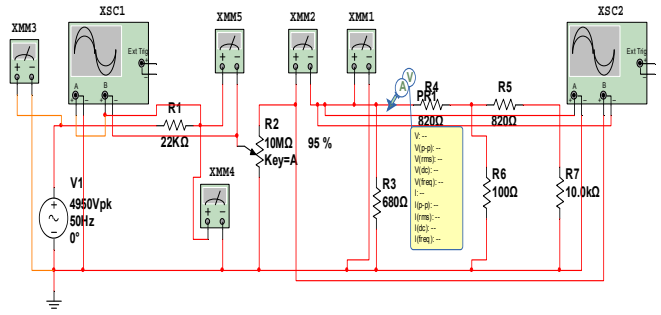


Fig. 8. Complete circuit of LC test of insulation

B. Proteus Simualtion

The method to simulate the output voltage and leakage current obtained in the multisim simulation, can be done by inputting the voltage and current in the microcontroller circuit created by using proteus software, as in Figure IV.3.

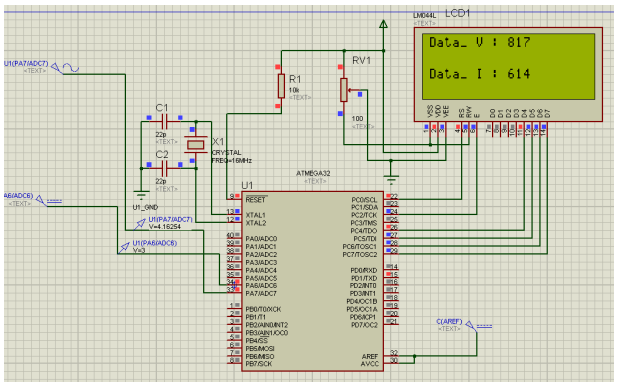


Fig. 9. Complete circuit data acquisiton using Proteus

IV. Results and Discussion

A. Simulation Measurement of Resistivity

Multisim provides source voltage in the form of peak voltage (Vpk). In the IPT testing performed a test with a voltage rms 3500 Volts. So to get the voltage Vpk done calculation as follows:

Vpk = Vrms x √2

Vpk = 3500 x 1.4142

Vpk = 4950 Vpk

This Vpk voltage is input to the AC source voltage value for testing. The selection of potentiometers with 10 Mega Ohm prisoners to present insulation resistance was based on the analysis of experiments in the laboratory, that when no contaminant stream has caused leakage current, the Test Voltage (input) is 3514.8 Volt and the input Measured is 0.31 mA (0.00031 Ampere) as shown in Fig. 10

Fig. 10. Measurment of voltage and input current

Then a calculation can be performed to determine the approximate value of the resistance on the material being tested or the insulation resistance tested for modeling in multisim is as follows:

$$R = \frac{V}{I} \quad R = \frac{3514.8}{0.00031} \quad R = 11.338.064 \text{Ohm}$$

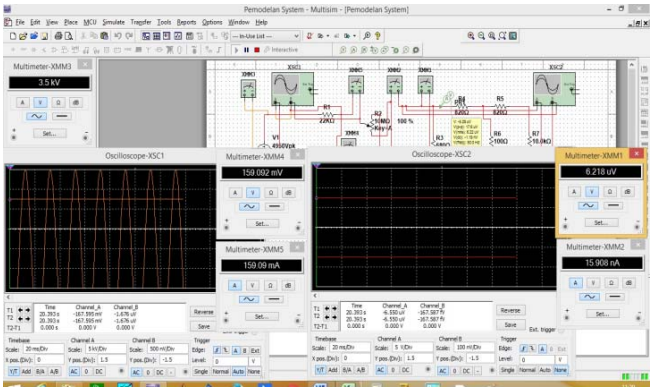
Then chosen is close to the R with 10 Mega Ohm.

In the test simulation, when the multisim program is in Run, gradually the resistance in insulation is gradually reduced by 5%. It starts with a 100% test of prisoners.

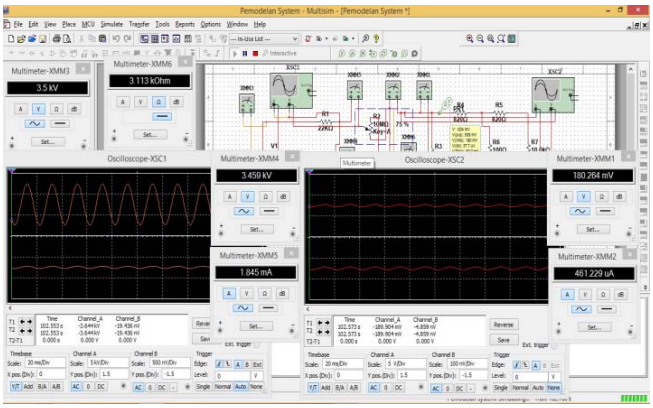
TABLE I. RT 5% PER STEP TO GET A REPLACEMENT

No	Rtest	Vin	Iin	Rp
	%	Volt	Ampere	Ohm
1	100%	0,159	0,159000000	10.000.000,00
2	95%	3470	0,001388000	9.500.000,00
3	90%	3469	0,001402000	9.000.000,00
4	85%	3468	0,001445000	8.500.000,00
5	80%	3467	0,001524000	8.000.000,00
6	75%	3464	0,001649000	7.500.000,00
7	70%	3459	0,001845000	7.000.000,00
8	65%	3453	0,002158000	6.500.000,00
9	60%	3441	0,002699000	6.000.000,00
10	55%	3417	0,003796000	5.500.000,00
11	50%	3345	0,007042000	5.000.000,00

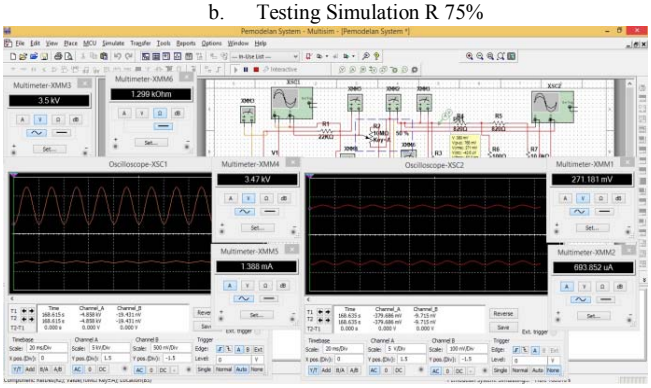
From table I it can be seen that, at the time of the insulation resistance tested 10 Mega Ohm, The voltage from the input side is considered short circuit, because the current is small and the resistance is large. When insulation resistance begins to shrink due to the contaminants flowing from phase to ground, the voltage detected decreases, the current becomes larger. The image of the simulation result on multisim is shown in Fig.11



a. Testing Simulation R 100%



b. Testing Simulation R 75%



c. Testing Simulation R 50%

Fig. 11. Simulation results with insulation (a) 100%, (b) 75% and (c) 50%

B. Simulation Measurement of Leakage Current

This leakage current measurement simulation can represent the ratio between the input current and the output current and the lost current which will be the ratio between the input and output currents in the experimental variation of 100% to 50% resistance. As shown in Table II

TABLE II. INPUT AND OUTPUT CURRENT DATA

No	Rtest	Iin	Iout (Ileak)	I loss
	%	Ampere	Ampere	Ampere
1	100%	0,159000	0,0000000159	0,1589999841
2	95%	0,001388	0,0003510500	0,0010369500
3	90%	0,001402	0,0003796000	0,0010224000
4	85%	0,001445	0,0004047690	0,0010402310
5	80%	0,001524	0,0004315530	0,0010924470
6	75%	0,001649	0,0004612390	0,0011877610
7	70%	0,001845	0,0004947980	0,0013502020
8	65%	0,002158	0,0005332820	0,0016247180
9	60%	0,002699	0,0005780060	0,0021209940
10	55%	0,003796	0,0006307240	0,0031652760
11	50%	0,007042	0,0006938520	-0,0006938520

From Table II a graph of the relationship between the input current and the output current, when testing the maximum resistance, the input current has not flowing. As the insulation resistance begins to shrink, then the output current or leakage current begins to flow. And this current will be fed to the microcontroller for further analysis. The graph is shown in Fig.12.

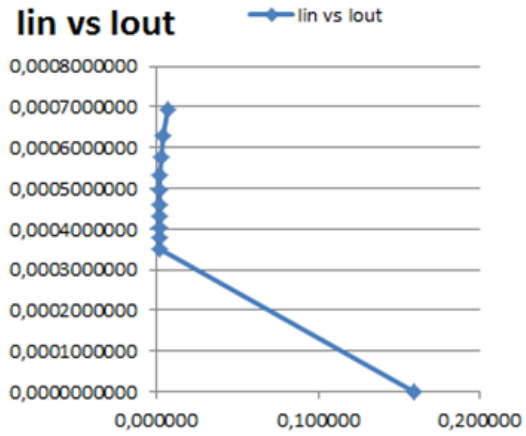


Fig. 12. Realtionship input current between output current

The lost current can be searched with the following formula: Ilosses = Iinput - Ioutput (Ileak). Example calculation of current loss for resistance of 75%, known I input = 0.001649 A and I output (Ileak) = 0.0004612390, then:

Ilosses = 0,001649 - 0,0004612390

Ilosses = 0,0011877610 Amper

C. Simulation of Data Acquisition using Proteus

When the results of Vout and Iout (Ileak) are simulated with proteus, for example we take one of the experiments at R = 80%, then we get the data:
V = 0.16866 Volt = 168.66 milliVolt.
I = 0.0004315530 (given 100x reinforcement) then
I = 0.004315530 = 43.15530 milliAmpere.
The current 43.15530 is converted with a current sensor of 1mV / 1mA, then the output voltage of the current sensor in milliVolt is V (I) = 43.15530x1 = 43,16mV. Images and simulation results in ADC values can be seen in Fig.13.

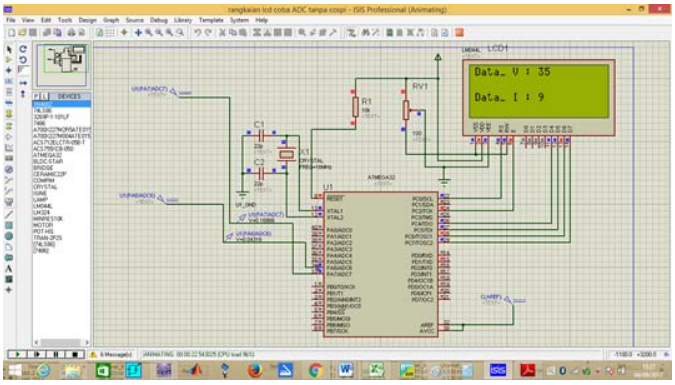


Fig. 13. Voltage and current value in decimal

Conversion to the voltage of the Decimal Data can be done in the following way:

Data Flow, Data_I = 9, ADC used 10 bits, Vref = 5 Volt, hence,
I = Decimal Data * (Vref / 2^{10})
I = 9 * (5/1024)
I = 9 * 0.0048828125
I = 0.0439453125 A = 43.95 mA

Data Voltage: Data_V = 35 ADC used 10 bits, Vref = 5 Volt, then, Fx = 3500/5 = 700
V = Vuji - (Decimal Data * (Vref / 2^{10}) * Fx)
V = 3500 - (35 * (5/1024) * Fx)
V = 3500 - (35 * 0,0048828125 * Fx)
V = 3500 - (0,1708984375 * 700)
V = 3500 - 119,62890625
V = 3380.37 Volts

V. Conclusion

From the simulation it can be concluded that the Resistance Insulation Value of the material under test can be determined, as the initial step can be simulated on multisim program. Leakage current and leakage voltage flow when there is contaminan causing leakage current and leakage voltage from phase to ground. The leakage current values and the measured leakage voltage can be used to further analyze the relationship between the leakage current and the leakage voltage with the insulating resistance of the material under test. The value of leakage current and leakage voltage can be further analyzed to determine the energy used when testing the electrical tracking of the insulating material. Simulation using Proteus can simulate data acquisition in electrical tracking test.

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A Multiple Classifiers Broadcast Protocol for VANET

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***Abstract*—Many types of artificial intelligent machines have been used for decision making purposes. In VANET broadcast protocols, vehicles must decide the received messages are to be rebroadcast or not. Several attributes such as sender-to-receiver distance, sender-receiver speed difference, number of neighboring vehicles, as well as vehicle's movement direction are important measures to take the broadcast decision. As the relationships of attributes to the broadcast decision cannot be mathematically defined, the use of a classifier-based artificial intelligence may approximately predict the relationships of all the incorporated attributes to such a decision. As the decision is based on prediction, the use of multiple classifiers in decision making may increase accuracy. Therefore, this research employs a combined-classifiers at an abstract level to provide firmer broadcast decisions on VANET. Our research results justify that the performance of our combined multiple-classifiers outperformed a single-classifier scheme. The multi-classifiers scheme contributes to an average increase of 2.5% in reachability compared to that of the efficient counter–based scheme (ECS). The combined multi-classifiers scheme also improves the saving in rebroadcast tries by 38.9%.**

***Keywords*—Broadcast-storm, classifier, VANET, vehicular attribute.**

I. Introduction

An efficient broadcast has always been a hot issue in broadcast protocol area. Several schemes have been available, from heuristic (e.g. probability-based, counter-based broadcast) to topology-based broadcast (e.g. distance-based broadcast). However, most of the solutions have used mostly only a few attributes (whether local or global), such as the use of sender-to-receiver distance, number of message duplicates received, or even only employing probability to reduce the number of nodes/vehicles that rebroadcast messages to mitigate the broadcast-storm problem (the massive message redundancy, contention and collision) [1, 2, 3, 4].

In reality, considering many attributes in the broadcast decision mechanism may lead to a more efficient broadcast scheme. For example, a vehicle having a greater distance from the sender vehicle is more potential to rebroadcast messages than that of having a smaller distance. Likewise, a vehicle that has a higher speed differential to the sender is considered to be a better broadcast candidate as it will go out from the sender's radio coverage fast. The number of neighboring vehicles can also be used to select the rebroadcast candidates. The denser the neighbors, the smaller the probability for a vehicle to rebroadcast. Therefore, a multiple-attributes scheme are more probable to outperform a single-attribute scheme if such attributes are properly treated.

To properly handle the attributes, a classification algorithm (known as a classifier or an expert) can be used to examine all the possible situations of the attributes dealing with current vehicular network situation. For example, a greater distance threshold should be applied for vehicles deserved rebroadcast in a dense network. However, a smaller threshold is required to maintain high network reachability. A classifier is able to recognize the input conditions of the attributes and to make decisions based on the knowledge obtained from prior training (called as model). Our work employs the following attributes: sender-to-receiver distance, number of message copies, vehicular density, as well as speed differential and movement direction.

Discussion of the research are presented in what follows. Research in broadcast protocols are presented in section 2. Sections 3 and 4 discuss how our experiments are set up and experimented. Results of the study are presented and discussed in section 5 and conclusions can be found in section 6.

II. The Broadcast-Storm Mitigation Schemes

One simple method to reduce the broadcast-storm is to use a probabilistic approach. The probabilistic based scheme uses probability mechanism for node selection rather than using a threshold mechanism (such as in distance-based threshold) for determining rebroadcast nodes. Basic broadcast techniques in VANETs follow either a *1*-persistence or a *p*-persistence scheme. The *1*-persistence scheme has the advantages of low complexity and high penetration rate, but creates massive redundancy. The *p*-persistence scheme may reduce message redundancy but may increase in total latency and degraded penetration rate. For example, literature [5] proposed three schemes: weighted *p*-persistence, slotted *1*-persistence, and slotted *p*-persistence broadcast schemes, whilst literature [6] proposed an adaptive probabilistic based scheme that senses idle channel time to represent the broadcast probability.

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A Bi-directional Boost Converter-Based Non-Isolated DC-DC Transformer with Modular Solid-State Switches for Medium-/High-Voltage DC Grids

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***Abstract*— In this paper, a bi-directional non-isolated dc-dc transformer is proposed, which can be used for connecting different dc voltage levels in medium-/high-voltage dc grids. The proposed dc-dc transformer is based on the conventional bi-directional boost converter, but with modular solid-state switches to avoid the complexity of employing series-connected Insulated Gate Bipolar Transistors (IGBTs) to meet the high-voltage requirement. The modular solid-state switch consists of cascaded modules, where each module consists of Half-Bridge Sub-Module (HB-SM) along with clamping IGBT. Small module capacitance is required in the proposed architecture as it is used typically to clamp the module voltage, not to store the energy to be delivered to the load. This affects positively the lifetime of the dc-dc transformer. On the other hand, clamping IGBTs ensure a successful operation with balanced capacitors' voltages without the need for voltage or current measurements. A detailed illustration for the proposed architecture is presented along with its operational modes and controller. Simulation results for a 2MW 10 kV/25 kV dc-dc transformer are presented to show the viability of the proposed architecture.**

Keywords— Bi-directional converter; dc-dc transformer; modular solid-state switch.

I. INTRODUCTION

The dc-dc transformer is an essential component in medium-/high-voltage dc grids for connecting two different dc voltage levels [1]. The dc-dc transformer can be classified into isolated [2-5] and non-isolated [6-10]. In the isolated type, an isolation transformer is employed to isolate between the high- and low-voltage sides.

The conventional non-isolated dc-dc boost converters are not normally used for applications requiring high voltage gains because of the difficulties with the main switch stresses [1], as the employed switches are rated at the higher voltage level. To meet the required high-voltage rating of the switch, series-connection of IGBTs [11], or multi-module dc-dc transformer configurations [9] can be used. In case of series connection of IGBTs, there are some challenges related to static and dynamic voltage sharing among the involved IGBTs. Active gate control can be deployed, yet with increasing system complexity [11].

While in case of multi-module converters, there are two possible connections [9]: cascaded converters and series converters. In cascaded converters [9], the first converter has intermediate voltage stresses and high current stresses, while the second converter has high voltage stresses and low current stresses. In addition, there is a difficulty in the control due to the interaction between converters. In case of series converters with one dc input [9], each converter processes only half of the input power, which enhances the system efficiency, and the employed switches are rated at half of the total voltage stress, which is still high for one IGBT. To reduce the voltage rating of employed switches, multi-module (generally, *n* modules) can be employed by connecting their output in series, but their inputs should be isolated which necessitates isolating transformers.

In order to meet the required high-voltage rating of switches in medium-/high-voltage applications without employing series-connection of switches nor multi-module converters, multi-module-cascaded high-voltage composite switch can be employed which enables recruiting low-voltage IGBTs in high-voltage applications.

In [12], a high-voltage composite switch, which is based on Modular Multilevel Converter (MMC), is proposed. This composite switch entails cascaded modules, where each module consists of a dc capacitor, a resistor, and four IGBTs (i.e. a Full-Bridge Sub-Module (FB-SM)). The voltage balancing is guaranteed automatically during the conduction modes of this configuration. The main drawback is that the number of required gate drivers is four times that with the series-connected IGBTs.

In this paper, a modular high-voltage switch with a reduced number of IGBTs is proposed for a bi-directional boost converter-based dc-dc transformer. The proposed modular switch entails cascaded modules, where each module consists of Half-Bridge SM (HB-SM) (each SM has two IGBTs and a small dc capacitor) along with clamping IGBT. The capacitance of the HB-SM is small, as the dc capacitor is used as a snubber circuit to clamp the voltage of the HB-SM not to store the energy to be delivered to the load. While clamping IGBTs are employed to ensure balanced capacitors' voltages during the operation without the need for voltage or current measurement. The modular switch's modules are operated with Marx concept, i.e. basic cell for Marx [13] is employed, where the capacitors are connected in parallel during the bypass mode (turn-on) of the modular switch, and are connected in series during the turn-off period of the modular switch. The HB-SMs' capacitances should be selected small enough to ensure insignificant effect on the boost converter operation and to limit the inrush current emanated from the repetitive switching of modules' capacitors during the operation. Detailed illustration and design for the proposed architecture are presented in the following sections.

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Feature Extraction Using Hilbert-Huang Transform for Power System Oscillation Measurements

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***Abstract*—Measurements of power system quantities available through implementation of Phasor Measurement Unit (PMU) enables direct observations of power system oscillations. However the PMU data need to be processed to obtain the quantitative measures required to predict the condition of power system. In this paper, Hilbert Huang Transform (HHT) is used to process phasor measurement data from PMU to extract important parameters. These parameters are used to discriminate between stable and oscillation condition. Finally, some results using simulation data based on actual PMU data characteristic are presented and used for validation.**

Keywords—phasor measurement unit; Hilbert Huang Transform (HHT); power system oscillation.

I. INTRODUCTION

With the development of phasor measurement units (PMU), power system parameter of phasor can now be observed. Data recorded from PMU are used to estimate the condition of power system in a wide area monitoring system. Due to limitations of PMU equipment specifications and error from measurement instrument, the data obtained by PMU may still have some errors[1]. However [1] shows that the differences of voltage phases angle from two PMU recorded data still can be used for analysis since it still has consistency.

Meanwhile with the increasing of transmission capacity in Indonesia due to load demand growth, system operation has become more complex and low frequency oscillations have become a new problem. These low frequency oscillations are badly damped and can grow, potentially leading to unstable system operation with devastating consequences such as black out. Consequently the poorly damped oscillation has to be detected and used to predict the outcome of this effect. These low frequency oscillations are usually in the range of 0.1 to 2 Hz [2]. The low frequency oscillation can be observed by monitoring phase angle of voltage between two points in power system network. Therefore phase angle that has been recorded by PMU has to be processed in order to identify the low frequency oscillation.

Usually, modal analysis is used to study the problem of power oscillation [3]. This analysis need detailed model of power system network and then linearize the model around particular operating point [4]. However the phenomena of power oscillation depends on system structure, power system operating point, etc. which is varying over the time. Therefore to monitor the oscillation in real time, the modal analysis could not be used since modal analysis is very slow and to obtain the detailed model of power system is not easy.

Other algorithm has been used to assess power system oscillation in [5]–[7]. In [8] various algorithms were compared and the results show that Hilbert-Huang Transform (HHT) method with Empirical Mode Decomposition (EMD) could be used to accurately estimate the power system oscillation for non-stationary signal. Thus, for real time data recorded by PMU the HHT method is best fit for identifying the oscillation.

This paper demonstrates the application of HHT with EMD to extract parameter that can be used to identify low frequency oscillation in power system. Data which is processed by HHT is simulation data that has been treated to mimic the actual PMU data characteristic. For comparison, the data from stable condition in power system will be processed as well. This paper is organized as follow: section II presents the algorithm of HHT with EMD. The data and result of process is given in section III, while discussion is provided in section IV. In section V, conclusion of the paper is presented.

II. HILBERT-HUANG TRANSFORM

Hilbert–Huang transform (HHT) is a data-analysis method which is the empirical mode decomposition method (EMD). In HHT, complicated data is decomposed into a set of finite intrinsic mode functions (IMF) that admit well-behaved Hilbert transforms. Important characteristics of the original signal are shown by EMD. Each of these oscillatory modes is reflected by an intrinsic mode function (IMF) with provisions [9]:

- The number of extreme and the number of zero-crossings must either equal or differ at most by one from dataset.
- The mean value of the envelope defined by the local maxima and the envelope defined by the local minima is zero at any point.

All local extremes are identified to decompose any function such as a low-frequency signal *s(t)*. All local maxima are then connected by a cubic spline line as shown in the upper envelope. The procedure is repeated for the local minima to

Regulatory Framework Creation Analysis to Reduce Security Risks The Use of Social Media in Companies

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Abstract— **Companies, agencies and individuals currently use social media as a means of communication and business facilities, because through social media the staffs can connect globally in expressing ideas, feelings or emotions. However, social media users need to be aware of the security risk to their organization. In this paper, we present a perception of the risks, benefits, and strategies of social media applications developed from societies that use social media in the company by discussing existing regulations and how they apply to the use of social media by companies/institutions also to overcome this challenge. From this research, a solution is made for companies whose security rules are being used by the public. This regulatory framework can serve as a basis for establishing company internal policies for the use of social media by its employees. With the creation of policies that are the result of this study, companies that have the maximum ability in the field of information technology.**
Keywords— Social media, security risk, privacy, Security policy

I. INTRODUCTION

Social media are common today. Social media is used for communication, from sending messages to sharing many things with the community and the people closest. The popularity of social media in the internet world has been widely used to build a network of friends to business networks, this forces businesses to adapt marketing strategies and involve social media as a marketing tool[1]. Some companies today are even actively creating specialized corporate social media communities such as corporate Twitter channels, YouTube channels, or Facebook fan pages. Social media are generally used for communication facilities in the company or as a media campaign and marketing[2].

The popularity of social media cannot be separated from the security risks that threaten users. The threat of this risk certainly affects the companies that are actively involved in social media and not alert[3]. Mistakes in using social media can lead to customer attacks, negative publicity and reputation damage to the company[4].

In addition to this, organizations are also facing threats from their own employees who often post on social media on behalf of the organization either through their personal accounts or company accounts. Other risks received can include phishing, information leakage, malware to hacking.

Social media policies are seen as an important part of the organization[5]. The regulatory framework is an important aspect of controlling the use of social media within corporations[6]. In this paper, we find the risks of using social media to develop more effective strategies to decrease the security threat by social media to companies through the establishment of a regulatory framework.

II. SOCIAL MEDIA SECURITY RISKS

The development of an increasingly modern era encourages the change of the system, either directly or indirectly, as in a company. Technological advances, especially the internet make the limitations of distance, time and cost can be easily overcome. Implementation of technology, in this case, to improve business, sales and buy of products is to use electronic commerce[7]. Company policies that are made for enterprise information security from social media are often only accepted for that purpose without being read and understood by users. The implications are privacy and security[8].

Through good communication, a company will feel comfortable and cut the perception of corporate risk, and ultimately can influence consumers in determining decisions in a company through social media. In accordance with research conducted by Khailil Leonil (2015) which states that perceived risk perception of consumers have a significant impact on online decisions, and related to the existence of online fraud, the company always pay attention to the quality of service in terms of risk perception, this is due to perception Risk contains uncertainty of a risk situation in a company that is product risk, transaction risk and psychological risk[9].

Understanding the perception of risk is needed[10]. Every person within a company has different perceptions of risk. A member of the IT department will see viruses or malware as a risk that could impact data loss on the company,