Archive

Year 2018 - 2005

2005	2006	2007	2008	2009
2010	2011	2012	2013	2018

Volume(Issue)

Volume:2/Issue:1

Owner : IRANIAN RESEARCH INSTITUTE FOR ELECTRICAL ENGINEERING (I.R.I.E.E.), JD

Expert Group : ENGINEERING & TECHNOLOGY

Journal Grade : Scientific Research

Publishing Period : Semiannually

Subject : Unknown

Printing ISSN : 1682-0053

Electronic ISSN :

Orginal Language : English

Second Language: : Persian

Manager : DR. TAYEBI H. R.

Editor in Chief : DR. SADEGH MOHAMMADI, H.R.

Executive Manager :

Phone : (021) 77453382

Address : IRANIAN RESEARCH INSTITUTE FOR ELECTRICAL ENGINEERING, TEHRAN, IRAN

About Us

Introduction to center

The Scientific Information Database (SID) was established on August 16, 2013, with the goal of advancing and disseminating scientific knowledge, expanding and enhancing information services, accelerating scientific explorations, simplifying access of researchers to the latest information sources published in journals and research accomplishments, and ultimately enhancing the effectiveness of research in the country. As the only Open Access scientific information bank under the domain www.SID.ir, this extensive reference database has been in operation synchronous with the latest scientific advances for more than fifteen years, emphasizing the significance of the national knowledge management role and preserving the national scientific heritage with the dual objective of "comprehensibility and updating and offers its services to the public through libraries of scholarly works, scientific societies, and research plans, among other services. SID declares its readiness for scientific cooperation with all scientific and research organizations and institutions in the country within the framework of the aforementioned services and accepts suggestions and constructive criticism in order to maintain continual communication with the scientific societies.

Bank and citation database of scientific publications of the country (Persian-English)

Taking into consideration the significance and role of academic publications in the scientific society of the country in addition to the goal of providing rich scientific resources for the use of researchers, the bank of scientific publications indexed the full text of articles in both Farsi and English sections and created a complete archive of publications from 2000 to date.

Facilities and services:

• Introducing and indexing comprehensively the up-to-date articles of academic journals of the country (approved by the Publications Commission of the Ministry of Science, Research and Technology, the Ministry of Health and Medical Education, and the Management Center of

• Introducing and indexing the articles of scientific journals of Iranian scientific organizations and centers
• Providing information about each publication on a dedicated page which accesses the archive section • Ability to search for names and key phrases among articles, publications, and authors
• Ability to sort search results based on the citations and references count, publication time, etc.
• Introducing and indexing the Iranian journals indexed in international reliable databases (ISI - Scopus)
• Introducing the authors of highly cited articles by year
• Introducing the prolific authors by year
• Introducing the indicators of a journal in different time frames
• Providing online service of Journal Citation Reports (JCR) divided into specialized groups and based on two common international indicators: Impact Factor and Immediacy Index

Bank of scientific conferences of the country (Persian-English)

Many specialized organizations and scientific and research centers organize scientific conferences and research assemblies to create a convenient environment for presenting new and innovative ideas, moreover to identify challenges, provide solutions, and obtain appropriate approaches. The valuable research and specialized articles of these reputable scientific societies are indexed in the conference bank of the SID available to researchers.

Facilities and services:

• Unrestricted and free access to the full text of the articles of the scientific conferences of the country with the permission of the organizers
• Accessing the conference articles comprehensively or classified into the specialized group
• Introducing and informing the upcoming conferences of the country based on key pillars, fucuses, and times as a social service to the organizers and users of scientific events for free.
• Searching articles categorized into the specialized group
• Ability to search for names and key phrases among articles, authors, and organizers of reputable conferences
• Presentation and access to short film and video articles of scientific conferences in the country

Facilities and services:

• Access to the abstracts of completed and ongoing Academic Center for Education, Culture and Research plans
• Access to the report of terminated plans provided by the Islamic Parliament Research Center
• Access to the abstracts of the terminated plans of organizations and scientific centers of the contracting parties
• Introduction of plans according to the specialized group
• Accessing the plans of each author on a separate page
• Introducing the research priorities of government and private scientific organizations and centers
• Access to theses sponsored by organizations and scientific centers of the contracting parties (scholarships)

Cooperation capacities

• Indexing the report of approved and implemented research plans in scientific-research organizations along with other scientific and research publications on a customized basis
• Specific indexing of the achievements and scientific productions of the scientific organizations and centers of the country
• Introducing produced and commercialized products of the research centers and organizations
• Introducing and providing information on the pillars and specialized capabilities of scientific and research organizations and centers
• Notifying of calls for conferences, training courses, and products on the most visited scientific pages
• Introducing the titles of completed plans and sponsored theses of scientific organizations and centers
• Providing and extracting customized scientific reports

Specialized services

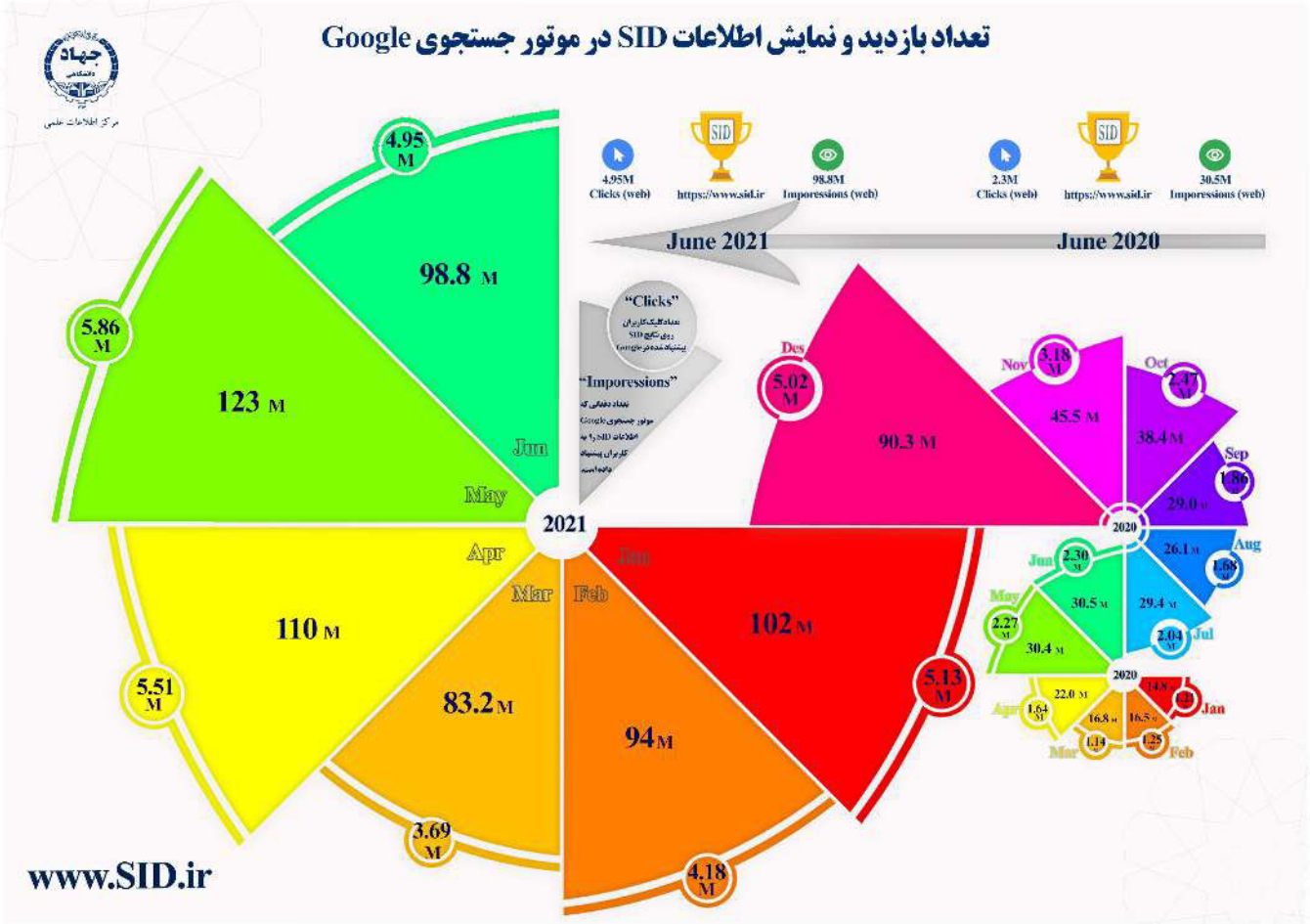
texts

• Data analysis system for scientific articles,

• Specialized blog and newsletter of the center to publish the latest news of scientific achievements and reports

• Mobile application

• Smart advertising and publishing advertorials



Old Version of SID.ir

ACECR Scientific Information Database

Address : No. 1, 4th All, Bahar Ave, Qamushi St, Ashrafi Esfahani Hwy, Tehran, Iran

Tel/fax : +982144265001-4

Post Code : 1461965381

Postbox: 1454-14515

Links

ACECR Central Office

Ministry of Science, Research and Technology

Ministry of Health and Medical Education

Other

Home

Workshop

Blog

About Us

Contact Us

Old Version of SID.ir

Journal Citation Report
Medical Journals Report 2021

Medical 474 Journal Title	Veterinary 35 Journal Title	Humanities 992 Journal Title	Basic Sciences 187 Journal Title
Agriculture 227 Journal Title	Engineering & Technology 240 Journal Title	Art & Architecture 55 Journal Title	Scientific 58 Journal Title

Explore

Old Version of SID.ir

SID Scientific Information Database

Home Banks Workshops & Courses Blog Hot Topics Organization Chart About Contact

ACECR

fa

SID-JCR

Journal Citation Report

JCR

SID Rank

Journal Evaluation & Ranking

More

Scientific Centers Journals

s

lournals

Ports & Maritime Journals

Ports & Maritime Organization Journals

List

ACECR Journals

ACECR Scientific Journals

List

Islamic Azad University

Islamic Azad University Journals

List

ISI Journa

Iranian ISI Jou

List

Up To Date Journals

Year 2022 Volume: 12 Issue: 45

JOURNAL OF COMMUNICATION ENGINEERING

ISLAMIC AZAD UNIVERSITY BUSHEHR BRANCH

Papers

Year 2022 Volume: 10 Issue: suppl 1

JOURNAL OF LAND MANAGEMENT

SOIL AND WATER RESEARCH INSTITUTE

Papers

Year 2023 Volume: 22 Issue: 67

JOURNAL OF GEOGRAPHICAL SCIENCES

KHARAZMI UNIVERSITY

Papers

Year 2022 Volume: 5 Issue: 14

QUARTERLY OF LEGAL ENCYCLOPEDIAS

IRANIAN LAW AND LEGAL RESEARCH INSTITUTE

Papers

Old Version of SID.ir

SID Scientific Information Database

Home Banks Workshops & Courses Blog Hot Topics Organization Chart About Contact

ACECR

fa

News & Events

مهم‌ترین موضوعات جستجو شده محققان در سال 2022

مهم‌ترین مخازن دسترسی آزاد برای دسترسی رایگان به مقالات

استفاده از این مخازن دسترسی آزاد کمک می کند تا محققان به متن کامل مقالات و کتاب‌ها به صورت رایگان دسترسی پیدا کنند.

چگونه مقاله علمی بنویسیم (قسمت اول)

در این سلسله پست ها سراغ چگونگی نگارش مقاله علمی برای افراد مبتدی خواهیم رفت.

سفر در زمان با هوش مصنوعی

با استفاده از ماشین زمان در هوش مصنوعی، فقط با چند کلیک می‌توانید عکس‌های خود را به شکل فرعون مصر، یک شوالیه قرون وسطایی یا یک فضانورد بسازید.

All Blogs

Workshops

Old Version of SID.ir

فراخوان دعوت به همکاری مدرسین جهت تولید محتوای آموزشی و برگزاری کارگاه

بدین‌وسیله مرکز اطلاعات علمی (SID) جهاددانشگاهی از کلیه متخصصان در تمامی حوزه‌های علمی، تخصصی دعوت می‌نماید تا در تولید محتوای آموزشی الکترونیکی، جهت ارائه در سامانه www.SID.ir/workshop، با این مرکز همکاری نمایند.

درصد تخفیف به مناسبت دهه فجر 30

ثبت نام کارگاه‌ها با ارائه گواهی نامه معتبر و بهره مندی از فیلم‌های آموزشی (بیش از 150 فیلم آموزشی)

کارگاه آموزشی میکروتیک

مدرس: جناب آقای مهندس سعید عزیزی (زمان برگزاری متعاقبا اعلام می گردد).

آموزش مهارت های کاربردی در تدوین و چاپ مقالات ISI

مدرس: آقای دکتر سیدمجتبی شفاعی، زمان برگزاری: 27 بهمن و 4 اسفند 1401 ساعت: 9 الی 14

All Workshops

Links

کافه رنت	بلیط هواپیما	خرید بلیط دبی	رزرو هتل
نهال گردو	اسپیس فریم	نظارت دات‌کام	مشاوره خانواده
بهترین مشاغل شیراز	نهال گردو	بلیط اتوبوس	دندانپزشک در شیراز
متخصص مغز و اعصاب سعادت آباد	تماشای فیلم و سریال های روز	tv حرف آخر	تور سفریار
چاپ کتاب	خرید لایک	بهترین نهال گردو	ناواران

Old Version of SID.ir

SID Scientific Information Database

Home Banks Workshops & Courses Blog Hot Topics Organization Chart About Contact

ACECR

fa

Papers Journals Seminars Plans Authors

Title Search Among 500,000 Papers

Journal Citation Report
Medical Journals Report 2021

Bank
Journals
+821,000
Journal Papers

Bank
Seminars
+145,000
Seminar Papers

Bank
Plans
+18,500
Plans & Projects

Bank
Authors
+1,200,000
Authors

Bank
Scientific Centers
+100
Scientific Centers

Bank
International Journals
+300
International Journals

JCR
Journal Citation Report
+2022
More

Bank
SID View/Download Reports
More

Newest Expert Services

Old Version of SID.ir

Analytical Reports

Data Analysis & Scientometric Reports

Translation & Editing

Translation & Editing (Specialized Scientific Texts)

Expert Services Scientific Information Database

Workshops & Courses

Holding specialized workshops and courses for the scientific empowerment of faculty members, students and researchers

More

Smart Advertising

Introducing the brand, products, services and scientific events in the most visited pages of information banks and scientific articles with related specialized topics in a special way

Apply Request

Educational Videos

View and download educational videos in all specialized fields

More

Seminars Indexing

Introducing and indexing the archive and video presentation of the articles of the held conferences with the ability to grant certificates

More

Old Version of SID.ir

SID Scientific Information Database

Home Banks Workshops & Courses Blog Hot Topics Organization Chart About Contact

ACECR

fa

Service (strs)

The possibility of introducing research plans and theses sponsored by organizations and introducing products and technical knowledge

More

Apply

Providing customized scientometric and data mining reports, providing consulting services in order to improve the scientific status of universities, scientific centers and researchers in reliable international rating systems.

More

The possibility of providing translation and editing services for articles and theses, etc., in various subject areas in accordance with the standards of journals and prestigious scientific conferences.

Order

Advertising

News & Events

Old Version of SID.ir

SID Scientific Information Database

Home Banks Workshops & Courses Blog Hot Topics Organization Chart About Contact

ACECR

fa

مهم‌ترین موضوعات جستجو شده محققان در سال 2022

مهم‌ترین مخازن دسترسی آزاد برای دسترسی رایگان به مقالات

استفاده از این مخازن دسترسی آزاد کمک می کند تا محققان به متن کامل مقالات و کتاب‌ها به صورت رایگان دسترسی پیدا کنند.

چگونه مقاله علمی بنویسیم (قسمت اول)

در این سلسله پست ها سراغ چگونگی نگارش مقاله علمی برای افراد مبتدی خواهیم رفت.

سفر در زمان با هوش مصنوعی

با استفاده از ماشین زمان در هوش مصنوعی، فقط با چند کلیک می‌توانید عکس‌های خود را به شکل فرعون مصر، یک شوالیه قرون وسطایی یا یک فضانورد بسازید.

All Blogs

Workshops

فراخوان دعوت به همکاری مدرسین جهت تولید محتوای آموزشی و برگزاری کارگاه

بدین‌وسیله مرکز اطلاعات علمی از کلیه متخصصان در (SID) جهاددانشگاهی تمامی حوزه‌های علمی، تخصصی دعوت می‌نماید تا در تولید محتوای آموزشی الکترونیکی، جهت ارائه در سامانه www.SID.ir/workshop، با این مرکز همکاری نمایند.

درصد تخفیف به مناسبت دهه فجر 30

ثبت نام کارگاه‌ها با ارائه گواهی نامه معتبر و بهره مندی از فیلم‌های آموزشی (بیش از 150 فیلم آموزشی)

کارگاه آموزشی میکروتیک

مدرس: جناب آقای مهندس سعید عزیزی (زمان برگزاری متعاقبا اعلام می گردد).

آموزش مهارت های کاربردی در تدوین و چاپ مقالات ISI

مدرس: آقای دکتر سیدمجتبی شفاعی، زمان برگزاری: 27 بهمن و 4 اسفند 1401 ساعت: 9 الی 14

All Workshops

ACECR Scientific Information Database

Qamushi St, Ashrafi Esfahani Hwy, Tehran, Iran

Tel/fax : +982144265001-4

Post Code : 1461965381

Postbox: 1454-14515

IRANIAN JOURNAL OF ELECTRICAL AND COMPUTER ENGINEERING (IJECE)

Year:2011 | Volume:10 | Issue:1

Journal Issue Information

Volume(Issue)

Volume:10/Issue:1

Volume:10/Issue:2

Download

EN فارسی Version

Keywords: ARTIFICIAL NEURAL NETWORK SUPERCONDUCTING MAGNETIC ENERGY STORAGE STABILITY ANALYSIS

Abstract : This paper presents an application of layered ANN controller to study load frequency control problem in power system.The objective of control scheme guarantees that steady state error of frequencies and

more

Yearly Impact : View 30586 Download 18915 Citation 0 Refrence 0

Journal Article

Title : TOPOLOGICAL AND PRIMITIVE IMPEDANCE BASED LOAD FLOW METHOD FOR RADIAL AND WEAKLY MESHED DISTRIBUTION SYSTEMS

Author(s): PRAKASH K. | SYDULU M.

Journal : IRANIAN JOURNAL OF ELECTRICAL AND COMPUTER ENGINEERING (IJECE)

Issue Info : Year: 2011 | Volume: 10 | Issue: 1 | Pages: 10-18

PDF Download

Keywords: BALANCED AND UNBALANCED DISTRIBUTION LOAD FLOW RADIAL AND WEAKLY MESHED DISTRIBUTION SYSTEM

Abstract : In this paper, an effective topological and primitive impedance based distribution power flow algorithm is developed for both balanced and unbalanced distribution systems. This method fully exploits the radial

more

EN فارسی Version

Yearly Impact : View 52797 Download 122193 Citation 0 Refrence 0

Journal Article

Title : SURFACE DISCHARGE CURRENT PATTERN PROPERTIES OF PORCELAIN INSULATOR SPECIMEN ON VARIOUS PRESSURES

Author(s): WALUYO - | SINISUKA N.I. | SUWARNO - | DJAUHARI M.A.

Journal : IRANIAN JOURNAL OF ELECTRICAL AND COMPUTER ENGINEERING (IJECE)

Issue Info : Year: 2011 | Volume: 10 | Issue: 1 | Pages: 19-26

PDF Download

Keywords: DISCHARGE CURRENT HARMONICS NON-LINEAR PORCELAIN SPECIMEN PRESSURE

Abstract : This manuscript presents the patterns of surface discharge currents due to pressure influence on the porcelain insulator specimen. It was subjected by the high voltages in a hermetically sealed chamber,

Journal Article

Title : ACCURATE FAULT LOCATION METHOD IN DISTRIBUTION NETWORKS CONTAINING DISTRIBUTED GENERATIONS

Author(s): JAMALI S. | TALAVAT V.

Journal : IRANIAN JOURNAL OF ELECTRICAL AND COMPUTER ENGINEERING (IJECE)

Issue Info : Year: 2011 | Volume: 10 | Issue: 1 | Pages: 27-33

PDF Download

Keywords: FAULT LOCATION DISTRIBUTION SYSTEMS DISTRIBUTED GENERATIONS

Abstract : This paper presents a new fault location method for radial distribution networks with distributed generations.The proposed fault location algorithm uses the voltage and current data obtained by digital

more

EN فارسی Version

Yearly Impact : View 41405 Download 14272 Citation 0 Refrence 0

Journal Article

Title : REAL TIME CONGESTION MANAGEMENT IN DEREGULATED ELECTRICITY MARKET USING ARTIFICIAL NEURAL NETWORK

Author(s): BALARAMAN SUJATHA | KAMARAJ N.

Journal : IRANIAN JOURNAL OF ELECTRICAL AND COMPUTER ENGINEERING (IJECE)

Issue Info : Year: 2011 | Volume: 10 | Issue: 1 | Pages: 34-40

PDF Download

Keywords: DEREGULATED ELECTRICITY MARKET TRANSMISSION CONGESTION CONTINGENCY ANALYSIS ARTIFICIAL NEURAL NETWORK (ANN) BACK PROPAGATION (BP) LEARNING METHOD

Abstract : Congestion management is one of the major tasks performed by system operators in deregulated environment to ensure the secure operation of transmission system. Congestion should be alleviated as

more

EN فارسی Version

Yearly Impact : View 34999 Download 19023 Citation 0 Refrence 0

Journal

Title : A COMPARATIVE EVALUATION OF ACTIVE AND PASSIVE WAVESHAPING METHODS FOR AC-DC CONVERTER

Download

Abstract : A comparative study of passive and active waveshaping filter (current-source fed CSF switch mode rectifier SMR converter supplied from single-phase AC supply) presented in this study. Active harmonic filter (boost

more

EN فارسی Version

Yearly Impact : View 30957 Download 15154 Citation 0 Refrence 0

Journal Article

Title : A NOVEL DUAL-BAND PRINTED DIVERSITY ANTENNA FOR 2.4/5.2 GHZ WLAN APPLICATIONS

Author(s): IMANI A. | NOURINIA J. | GHOBADI CH.

Journal : IRANIAN JOURNAL OF ELECTRICAL AND COMPUTER ENGINEERING (IJECE)

Issue Info : Year: 2011 | Volume: 10 | Issue: 1 | Pages: 45-48

PDF Download

Keywords: CORRELATION COEFFICIENT DIVERSITY ANTENNAS MEAN EFFECTIVE GAIN PATTERN DIVERSITY

Abstract : In this paper a novel dual-band printed diversity monopole antenna integrated on a PCMCIA network card is proposed and studied. The antenna which consists of two monopoles with symmetric configuration

more

EN فارسی Version

Yearly Impact : View 19442 Download 11141 Citation 0 Refrence 0

Journal Article

Title : REACTIVE POWER CONTROL IN EIGHT BUS SYSTEM USING FC-TCR

Author(s): VIJAYAKUMAR T. | NIRMALKUMAR A.

Journal : IRANIAN JOURNAL OF ELECTRICAL AND COMPUTER ENGINEERING (IJECE)

Issue Info : Year: 2011 | Volume: 10 | Issue: 1 | Pages: 49-53

PDF Download

Keywords: FACTS TCR MATLAB FC FFT THD PWM HARMONICS SIMULINK REACTIVE POWER

Abstract : This paper deals with the simulation of eight bus system having fixed capacitor and thyristor controlled reactor. The system is modeled and simulated using MATLAB. The simulation results are presented. The

more

Archive

Year 2018 - 2005

2005	2006	2007	2008	2009
2010	2011	2012	2013	2018

Volume(Issue)

Volume:2/Issue:1

Owner : IRANIAN RESEARCH INSTITUTE FOR ELECTRICAL ENGINEERING (I.R.I.E.E.), JD

Expert Group : ENGINEERING & TECHNOLOGY

Journal Grade : Scientific Research

Publishing Period : Semiannually

Subject : Unknown

Printing ISSN : 1682-0053

Electronic ISSN :

Orginal Language : English

Second Language: : Persian

Manager : DR. TAYEBI H. R.

Editor in Chief : DR. SADEGH MOHAMMADI, H.R.

Executive Manager :

Phone : (021) 77453382

Address : IRANIAN RESEARCH INSTITUTE FOR ELECTRICAL ENGINEERING, TEHRAN, IRAN

IJECE
Iranian Journal of Electrical and Computer Engineering

Manager-in-Charge

H. R. Tayebi

AssociateProfessor

Prof

جهاد دانشگاهی

Editor-in-Chief

H. R. Sadegh Mohammadi
AssociateProfessor
mohammadis@acecr.ac.ir
Prof
پژوهشکده برق جهاد دانشگاهی

Editorial Board

M. Ehsan
Prof
ehsan@sharif.ac.ir
Prof
دانشگاه صنعتی شریف

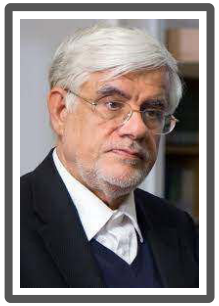
R. Jalili
AssociateProfessor
jalili@sharif
Prof
دانشگاه صنعتی شریف

A. Khaki Sedigh
Prof
sedigh@kntu.ac.ir
Prof
دانشگاه صنعتی خواجه نصیرالدین طوسی

M. H. Savoji
Prof
savoji.mohammad@yahoo.com
Prof
دانشگاه شهید بهشتی

H. Seifi
Prof
seifi_ho@modares.ac.ir
Prof
دانشگاه تربیت مدرس

M. Shafiee
Prof
mshafiee@aut.ac.ir
Prof
دانشگاه صنعتی امیر کبیر



M. R. Aref
Prof
aref@sharif.edu
Prof
دانشگاه صنعتی شریف

M. Fathi
Prof
mahfathy@iust.ac.ir
Prof
دانشگاه علم و صنعت ایران

M. K. Moravvej Farshi
Prof
moravvej@modares.ac.ir
Prof
دانشگاه تربیت مدرس

Hamid Reza Sadegh Mohammadi
AssociateProfessor

mohammadis@acecr.ac.ir
Prof
09121592700

Executive Manager

سميه عبادي
PostGraduateDegree
karshenas@ijece.org
AssociateProfessor
پژوهشكده برق جهاد دانشگاهي

Old Version of SID.ir

چارت سازمانی

چارت تشکیلاتی مرکز اطلاعات علمی جهاددانشگاهی (SID)

ریاست

خانم دکتر فاطمه عقیمزاده
رئیس مرکز اطلاعات علمی
تحصیلات: دکترای فناوری اطلاعات
تاریخ انتصاب: 1394

معاونت توسعه بانک‌ها و خدمات تخصصی

آقای محمدمهدی مشیدی
معاون توسعه بانک‌ها و خدمات تخصصی

معاونت مهندسی و فناوری اطلاعات

اداره پشتیبانی

آقای رامین دادرسی
مدیر اداره پشتیبانی

اداره تأمین منابع علمی و مدیریت دانش

آقای سعید وزوایی
مدیر اداره تأمین منابع علمی و مدیریت دانش

اداره نرم‌افزار و پشتیبانی سرویس‌ها

آقای غلامعباس حمزه‌لو
مدیر اداره نرم‌افزار و پشتیبانی سرویس‌ها

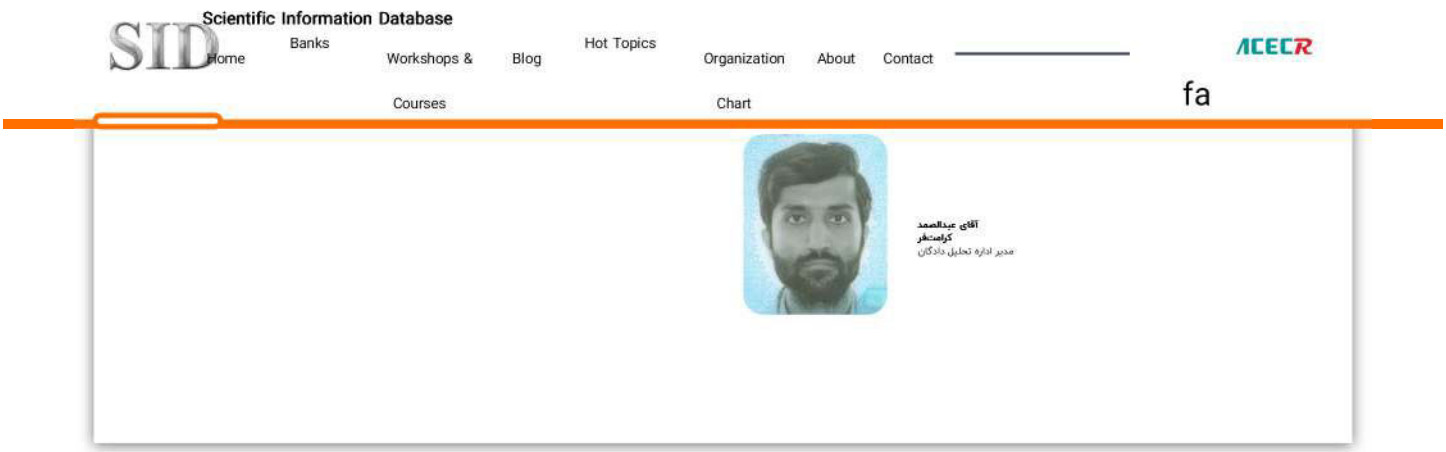
اداره روابط عمومی

خانم محبت پورزارع
کارشناس روابط عمومی

اداره ورود اطلاعات

اداره سخت‌افزار و امنیت شبکه‌ها

Old Version of SID.ir



ACECR Scientific Information Database

Address : No. 1, 4th All, Bahar Ave, Qamushi St, Ashrafi Esfahani Hwy, Tehran, Iran

Tel/fax : +982144265001-4

Post Code : 1461965381

Postbox: 1454-14515

Links

ACECR Central Office

Ministry of Science, Research and Technology

Ministry of Health and Medical Education

Other

Home

Workshop

Blog

About Us

Contact Us

نشان ملی ثبت (رسانه های دیجیتال)
samandehi.ir

Contact Us

Contact Info

مرکز اطلاعات علمی جهاددانشگاهی (Scientific Information Database)

Address: No. 1, 4th Ally, Bahar Street, Qamushi Avenue, Ashrafi Esfahani Highway, Tehran, Iran

Postal Code: 65381-14619

P.O. Box: 1454-14515

(+9821) 44265001-4

Fax: (+9821) 44265001-4 Extension 124

Working hours: 7:00 a.m. to 14:30 p.m. (except Thursdays and holidays)

Ways to contact us

Section	Department	Full Name	Role	Phone	Email
Presidency	Presidency and Public Relations	Mrs. Azimzadeh	Head	44265001-4 Ext 101	-

	Support Department	Miss. Sadeghi	Financial Expert	44265001-4 Ext 106	-
		Miss. Lashani	Administrative Affairs Expert	44265001-4 Ext 117	-
Deputy for the Development of Datasources and Specialized Services	Deputy for the Development of Datasources and Specialized Services	Mr. Moshayedi	Deputy	44265001-4 Ext 101	-
	Department of providing scientific resources and knowledge management	Mr. Vezvaei	Department Manager	44265001-4 Ext 111	journals@sid.ir
		Mr. Shojaeian	Human Sciences and Veterinary Journals Expert	44265001-4 Ext 107	-
		Mr. Golabadi	Medical and Engineering Journals Expert	44265001-4 Ext 108	-
		Mrs. Hejazi	Agricultural, Arts and Basic Sciences Journals Expert	44265001-4 Ext 112	-
	Specialized Services Project Management Department	Mr. Sargoli	Special Journals Expert	44265001-4 Ext 115	prj@sid.ir
			STRS - "Editorial System" Support	09024026435	stes@sid.ir
		Mrs. Ebrahimi	STRS.ir - "Trasnlation System" Support	44265001-4 Ext 114	strs@sid.ir
				0902 402 6434	
		Miss. Ghasempour	Workshops Expert	44265001-4 Ext 109	workshop@sid.ir
				09217023642	
		Mr. A'lami	Advertisement	44265001-4 Ext 119	adv@sid.ir
			Scientific Conferences and Research Plans Expert	0938 543 6660	conf@sid.ir
	Data Entery Department		Data Entery Experts	44265001-4 Ext 120	-
Deputy of Engineering and Information Technology	Software and Service Support Department	Mr. Hamzelue	Manager	44265001-4 Ext 116	sidir@sid.ir
		Mr. Molazeinali	Hardware Expert	44265001-4 Ext 118	-

Old Version of SID.ir

ACECR Scientific Information Database

Address : No. 1, 4th All, Bahar Ave, Qamushi St, Ashrafi Esfahani Hwy, Tehran, Iran

Tel/fax : +982144265001-4

Post Code : 1461965381

Postbox: 1454-14515

Links

ACECR Central Office

Ministry of Science, Research and Technology

Ministry of Health and Medical Education

Other

Home

Workshop

Blog

About Us

Contact Us

Journal Information

IRANIAN JOURNAL OF ELECTRICAL AND COMPUTER ENGINEERING (IJECE)

IRANIAN JOURNAL OF ELECTRICAL AND COMPUTER ENGINEERING (IJECE)

Owner : IRANIAN RESEARCH INSTITUTE FOR ELECTRICAL ENGINEERING (I.R.I.E.E.), JD
Expert Group : ENGINEERING & TECHNOLOGY
Journal Grade : علمی پژوهشی
Publishing Period : Bimonthly
Subject :

Printing ISSN : 1682-0053
Electronic ISSN :
Orginal Language : English
Second Language: : Persian

Manager : DR. TAYEBI H. R.
Editor in Chief : DR. SADEGH MOHAMMADI, H.R.

Phone : (021) 77453382
Fax : (021) 77453382
Website : www.ijece.org
EMail :
Address : IRANIAN RESEARCH INSTITUTE FOR ELECTRICAL ENGINEERING, TEHRAN, IRAN

Search Among this Journal Papers

Archive

Group ENGINEERING & TECHNOLOGY

Views 4,594,069

Downloads 3,357,766

Archive

Year 2018 - 2005

2005	2006	2007	2008	2009
2010	2011	2012	2013	2018

Volume(Issue)

Volume:2/Issue:1

ACECR
Scientific Information Database

Address : No. 1, 4th All, Bahar Ave, Qamushi St, Ashrafi Esfahani Hwy, Tehran, Iran

Tel/fax : +982144265001-4

Post Code : 1461965381

Postbox: 1454-14515

Iranian Journal of Electrical and Computer Engineering

COUNTRY

Iran

Universities and research institutions in Iran

Media Ranking in Iran

SUBJECT AREA AND CATEGORY

Computer Science
Computer Science (miscellaneous)

Engineering
Electrical and Electronic Engineering

PUBLISHER

ACECR

H-INDEX

13

PUBLICATION TYPE	ISSN	COVERAGE
Journals	16820053	2004-2013

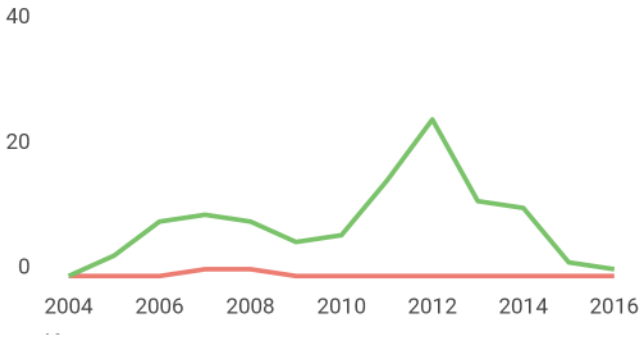
Join the conversation about this journal

Quartiles

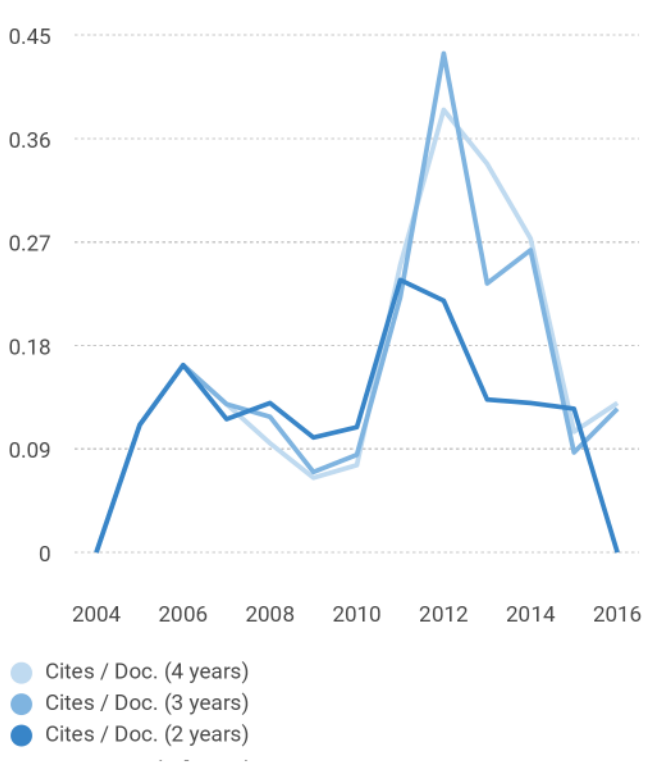
SJR

Total Documents

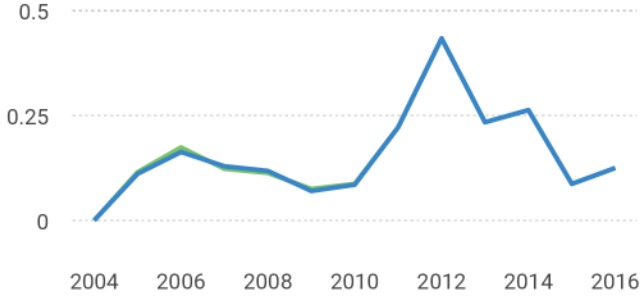
Total Cites Self-Cites



Citations per document



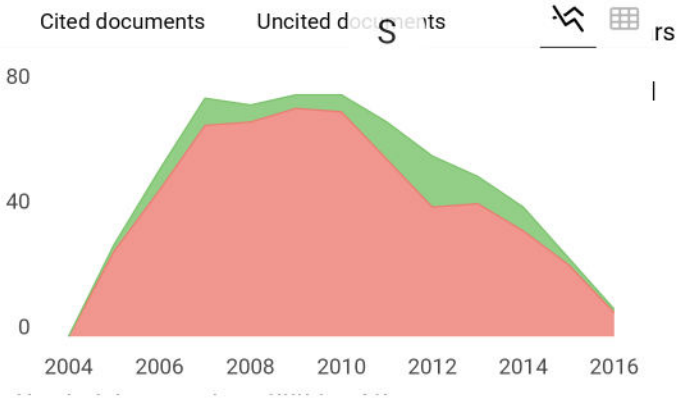
External Cites per Doc Cites per Doc



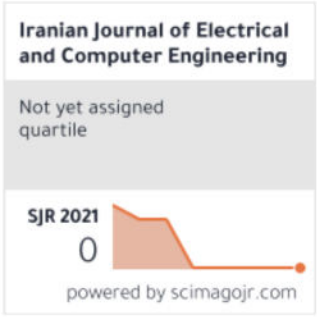
% International Collaboration

Citable documents Non-citable documents

M



S rs



← Show this widget in your own website

Just copy the code below and paste within your html code:

<a href="https://www.scim

SCImago Graphica

Explore, visually communicate and make sense of data with our **new data visualization tool**.

SCImago Team

Melanie Ortiz 3 years ago

Dear Shalini,
Thank you for contacting us. Our data come from Scopus, they annually send us an update of the data. This update is sent to us around April / May every year. Thus, the indicators for 2019 will be available in June 2020. Best Regards, SCImago Team

Leave a comment

Name

Email
(will not be published)

Submit

The users of Scimago Journal & Country Rank have the possibility to dialogue through comments linked to a specific journal. The purpose is to have a forum in which general doubts about the processes of publication in the journal, experiences and other issues derived from the publication of papers are resolved. For topics on particular articles, maintain the dialogue through the usual channels with your editor.

Source details

Iranian Journal of Electrical and Computer Engineering

Scopus coverage years: from 2004 to 2013
(coverage discontinued in Scopus)
Publisher: Jahad Daneshgahi
ISSN: 1682-0053
Subject area: Computer Science: General Computer Science | Engineering: Electrical and Electronic Engineering
Source type: Journal

SJR 2016
0.103

SNIP 2016
0.561

View all documents > | Set document alert | Save to source list | Source Homepage

¡ Improved CiteScore methodology

CiteScore 2023 counts the citations received in 2020-2023 to articles, reviews, conference papers, book chapters and data papers published in 2020-2023, and divides this by the number of publications published in 2020-2023. Learn more >

View CiteScore methodology > | CiteScore FAQ >

About Scopus

What is Scopus

Content coverage

Scopus blog

Scopus API

Privacy matters

Language

日本語版を表示する

查看简体中文版本

查看繁體中文版本

Просмотр версии на русском языке

Customer Service

Help

Tutorials

Contact us

Title

SURFACE DISCHARGE CURRENT PATTERN PROPERTIES OF PORCELAIN INSULATOR SPECIMEN ON VARIOUS PRESSURES

Author(s) WALUYO - | SINISUKA N.I. | SUWARNO - | DJAUHARI M.A.

Keywords DISCHARGE CURRENT HARMONICS NON-LINEAR PORCELAIN SPECIMEN PRESSURE

Abstract This manuscript presents the patterns of surface DISCHARGE CURRENTs due to PRESSURE influence on the porcelain insulator specimen. It was subjected by the high voltages in a hermetically sealed chamber, where the PRESSURE could be adjusted and measured simultaneously. The applied voltage and DISCHARGE CURRENT waveforms were recorded by a storage digital oscilloscope, transferred and saved to a computer. The DISCHARGE CURRENT waveforms were analyzed by using FFT, correlation coefficient and principal component analyses.The yielded DISCHARGE CURRENTs were in intermittent conditions. After the fundamental, the second highest HARMONICS was third. The DISCHARGE CURRENT amplitude increased significantly as the PRESSURE reduced. The characteristics between DISCHARGE CURRENT and applied voltage magnitudes were more extremely NON-LINEAR as the PRESSUREs reduced, especially they were lower than the atmospheric PRESSURE. The discharge breakdown voltage increased as the air PRESSURE rose. It required a voltage magnitude threshold to be discharge.Almost HARMONICS had the negative correlation coefficients on the PRESSURE, except the THD which had 0.45. The increasing THD was more dominantly caused by the increasing first HARMONICS which was slighter than the increasing remaining HARMONICS.

Old Version of SID.ir

ACECR Scientific Information Database

Address : No. 1, 4th All, Bahar Ave, Qamushi St, Ashrafi Esfahani Hwy, Tehran, Iran

Tel/fax : +982144265001-4

Post Code : 1461965381

Postbox: 1454-14515

Links

ACECR Central Office

Ministry of Science, Research and Technology

Ministry of Health and Medical Education

Other

Home

Workshop

Blog

About Us

Contact Us

Journal Paper

Paper Information

Journal:
Year:0 | Volume: | Issue:
Start Page: | End Page:

Information Journal Paper

Title SURFACE DISCHARGE CURRENT PATTERN PROPERTIES OF PORCELAIN INSULATOR SPECIMEN ON VARIOUS PRESSURES

Writers WALUYO - | SINISUKA N.I. | SUWARNO - | DJAUHARI M.A.

Keywords DISCHARGE CURRENT

Abstract This manuscript presents the patterns of surface DISCHARGE CURRENTs due to PRESSURE influence on the porcelain insulator specimen. It was subjected by the high voltages in a hermetically sealed chamber, where the PRESSURE could be adjusted and measured simultaneously. The applied voltage and DISCHARGE CURRENT waveforms were recorded by a storage digital oscilloscope, transferred and saved to a computer. The DISCHARGE CURRENT waveforms were analyzed by using FFT, correlation coefficient and principal component analyses.The yielded DISCHARGE CURRENTs were in intermittent conditions. After the fundamental, the second highest HARMONICS was third. The DISCHARGE CURRENT amplitude increased significantly as the PRESSURE reduced. The characteristics between DISCHARGE CURRENT and applied voltage magnitudes were more extremely NON-LINEAR as the PRESSUREs reduced, especially they were lower than the atmospheric PRESSURE. The discharge breakdown voltage increased as the air PRESSURE rose. It required a voltage magnitude threshold to be discharge.Almost HARMONICS had the negative correlation coefficients on the PRESSURE, except the THD which had 0.45. The increasing THD was more dominantly caused by the increasing first HARMONICS which was slighter than the increasing remaining HARMONICS.

Cites

- No record.

References

- No record.

Related Journal Papers

- No record.

Related Seminar Papers

- No record.

Related Plans

- No record.

Recommended Workshops

- آینده مشاغل و مشاغل آینده در حوزه مواد پیشرفته
- در مشاغل آینده IT و IT آینده مشاغل
- آینده مشاغل آموزش و آموزش مشاغل آینده
- فرصت ها و نیازهای مشاغل آینده با رشد اینترنت اشیاء
- هوش مصنوعی و آینده مشاغل
- آینده مشاغل در صنعت بازی های ویدیویی
- تاثیر هوش تجاری بر آینده مشاغل و مشاغل آینده
- جایگاه نوآوری باز در مشاغل آینده
- حکمرانی فناوری اطلاعات (فرصت های اشتغال حال و آینده)
- و هرس الفا بتا mini-max الگوریتم
- رایانش ابری و کلان داده ها
- فرصت های کارآفرینانه در کسب و کارهای آینده ایران
- سواد دیجیتال و بازاریابی محصول در مشاغل آینده
- MATLAB (متلب)
- Greedy Best First Search
- آینده مشاغل حوزه بیوالکترومغناطیس و مشاغل مرتبط
- Algoritm backtracking
- متاورس و مشاغل آینده
- انرژی های تجدیدپذیر و چشم انداز کسب و کارهای مرتبط در آینده
- دانشگاه ها و مشاغل آینده

Surface Discharge Current Pattern Properties of Porcelain Insulator Specimen on Various Pressures

Waluyo, N. I. Sinisuka, Suwarno, and M. A. Djauhari

***Abstract*—This manuscript presents the patterns of surface discharge currents due to pressure influence on the porcelain insulator specimen. It was subjected by the high voltages in a hermetically sealed chamber, where the pressure could be adjusted and measured simultaneously. The applied voltage and discharge current waveforms were recorded by a storage digital oscilloscope, transferred and saved to a computer. The discharge current waveforms were analyzed by using FFT, correlation coefficient and principal component analyses.**

The yielded discharge currents were in intermittent conditions. After the fundamental, the second highest harmonics was third. The discharge current amplitude increased significantly as the pressure reduced. The characteristics between discharge current and applied voltage magnitudes were more extremely non-linear as the pressures reduced, especially they were lower than the atmospheric pressure. The discharge breakdown voltage increased as the air pressure rose. It required a voltage magnitude threshold to be discharge. Almost harmonics had the negative correlation coefficients on the pressure, except the THD which had 0.45. The increasing THD was more dominantly caused by the increasing first harmonics which was slighter than the increasing remaining harmonics.

***Index Terms*—Discharge current, harmonics, non-linear, porcelain specimen, pressure.**

I. Introduction

OVERHEAD transmission or distribution lines are widely used in present power system to transmit electric power from generation stations to customer points. Their proper function largely depends on the insulation system with the supporting structures [1]. The performance of outdoor insulators, as main insulating materials, is influenced by some parameters, one of them is atmospheric pressure.

The study of flashover process very important for electric power supply reliability, efficiency and serviceability. The main events leading to flashover of polluted insulators under service voltages are the formations of conductive layer on the insulator surface, leakage current surging with associated dry band formation and partial arc development and arc propagation along the insulator surface eventually spanning the whole insulator [2]-[7]. The third harmonic components of leakage currents are indications of dry-band arcing rather than a threshold value [8]. According to [9], the relation flashover voltage and pressure is

$$\frac{V}{V_0}=\left(\frac{p}{p_0}\right)^{\frac{c}{(n+1)}}=\left(\frac{p}{p_0}\right) \quad (1)$$

Until now, m are various values, 0.31 upto 0.81. While the theoritical value is 0.2. Little attention to temperature during the experiment may be a possible reason for the scatter of the value. This equation can be written as

$$\frac{V}{V_0}\approx 1-m\left(\frac{\Delta p}{p_0}\right) \quad (2)$$

It shows a linear relation between contamination flashover voltage and pressure. It was stated that under constant temperature, a 5% reduction in contamination flashover voltage per 1 km of altitude is anticipated.

At high altitude areas, reduction of both temperature and pressure occurs, so that it is necessary to evaluate simultaneously the effect of both temperature and pressure on contamination flashover voltage of insulators [9].

A flashover voltage increased asymptottically as the pressure rose [10], [11]. Nevertheless, the flashover voltage decreased parabollically as the pressure reduced below normal condition. However, the impulse flashover voltage rose linearly as the pressure increased [12]. The dependence of line and substation insulators, which had the range of pollution density from 2 to 14 μS at p/p_o from 1 to 0.7, is approximately identical at various air pressure [13], [14]. The flashover voltage increased as linear logaritmic with pressure increased too [15].

Almost cited references discussed regarding magnitudes of flashover or discharge voltages or their gradients. Only few references discussed influence of pressure to flashover or discharge voltages. It was minus in discussion concerning the current patterns of discharge or flashover on a insulator or specimen with the pressure influence. Thus, it was necessary to investigate the discharge current patterns on the porcelain insulator specimen and their behaviours due to pressure change. The objectives were to obtain the characteristics of discharge current amplitudes, harmonic patterns and total harmonic distortions (THDs). The patterns were presented by the harmonics. Finally, the parameter behaviour on the pressure was obtained by using the correlation coefficient and principal component analysis.

Manuscript received August 10, 2010; revised April 4, 2011.

This work was supported by the KK-ITB Research Grant, 2009.

Waluyo, N. I. Sinisuka, and Suwarno are with the School of Electrical Engineering and Informatics, ITB, Bandung, Indonesia (e-mails: waluyo@hv.ee.itb.ac.id, ngapuli@hv.ee.itb.ac.id, suwarno@ieee.org).

M. A. Djauhari is with the Department of Mathematics, UTM, Johor Bahru, Malaysia. (email: maman@utm.my).

Publisher Item Identifier S 1682-0053(11)1892

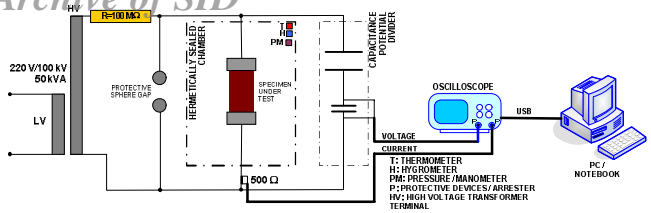


Fig. 1. The Schematic diagram of discharge current measurement setup.

II. Experimental and Analysis Methods

The porcelain insulator specimen under test was given one water drop of dried kaolin solution as artificial pollutant for making lower threshold voltage magnitude. The leakage length was 3 cm. It was tested in the hermetically sealed chamber, where its pressure could be adjusted and measured simultaneously. The pressure could be enhanced by a compressor and reduced by a vacuum pump. It was indicated by negative and positive displays respectively on the digital manometer.

The measurements and recordings of discharge current and applied voltage waveforms simultaneously used a two-channel storage digital oscilloscope. The data were transferred to a computer by using USB and saved in softcopy forms. The waveform data were in drawing (bitmap) and numerical (csv) files. The latters were for further analyses. The schematic diagram of discharge current measurement setup is shown in Fig. 1.

Moreover, the discharge current waveforms were analyzed by using FFT (fast Fourier transform), to obtain the harmonics spectra on some pressures. These implementations used the Danielson-Lanczos method [16]. It was necessary total harmonic distortion (THD) to quantify the waveforms of discharge currents. If a THD closed zero, the waveform approached the pure sinusoidal waveform, and vice versa. THD is defined as [17].

$$THD = \frac{\sqrt{\sum_{n=2}^{\infty} I_n^2}}{I_1} \quad (3)$$

The relations among parameters were analyzed by using correlation coefficient analyses, the derivation of covariance matrix to represent the correlations among parameters based on data [18], [19]. The component of correlation matrix is correlated by

$$\rho_{x,y} = \frac{Cov(X,Y)}{\sigma_x . \sigma_y} \quad (4)$$

Another way to assess among parameter correlations is using principal component analysis (PCA) [20]-[22]. If a set of data is presented in matrix X, the main algorithm of PCA involves some steps.

First, determining the mean components of matrix X, those are related by

$$\bar{x}_l = \frac{1}{n}\sum_{k=1}^{n} x_{1,k} \quad (5)$$

Second. determining covariance matrix using equation of

$$C = X * X^T \quad (6)$$

Third, determining eigen values and eigen vectors of covariance matrix using equation of

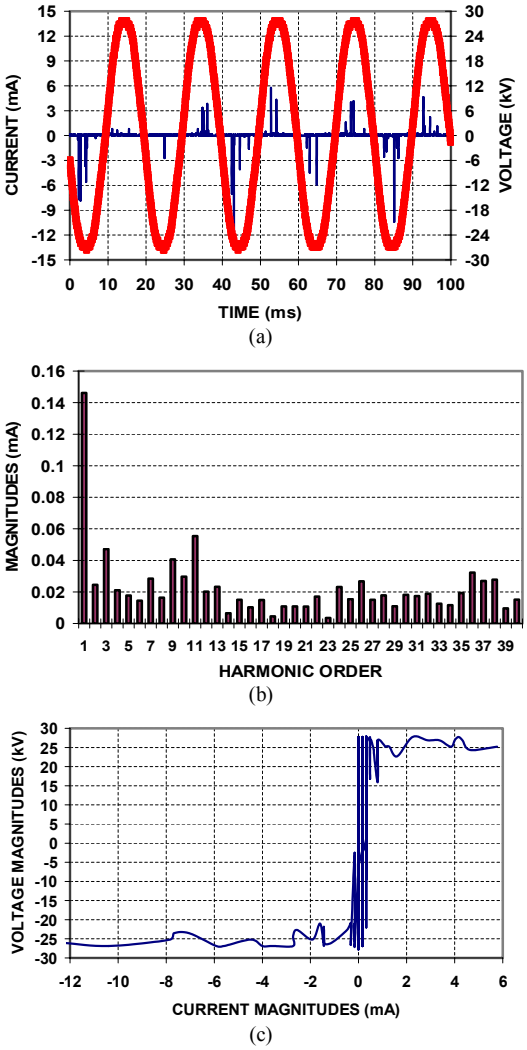


Fig. 2. The discharge current characteristics on 27.7 kVmax and without additional pressure; (a) discharge current and applied voltage waves, (b) discharge current harmonics spectrum, and (c) V-I characteristics.

$$CQ = \lambda Q \quad (7)$$

Finally, their scatters were plotted in two dimensions, for first and second principal components. Thus, the nearness of parameters indicates their correlations

III. Research Results and Discussion

Fig. 2(a) shows the sample of the discharge current and applied voltage waveforms, where the chamber was exactly same as the room atmospheric pressure. The discharge current was occurred in intermittent, so that it was not continual. The applied voltage amplitude was 28 kV_{peak}. The discharge current and applied voltage magnitudes are shown on the left and right sides. Fig. 2(b) shows the corresponding harmonics of discharge current wave. As important points of view, the fundamental, third and fifth harmonics were 146 μA, 47 μA and 18 μA or the percentages on the fundamental were 32.3% and 12.1% for the third and fifth ones respectively. The THD was 75.8%. The significances were third, ninth and eleventh harmonics after the fundamental. Fig. 2(c) shows the discharge current and applied voltage magnitude chart. The property of discharge condition was in non-linear. The average negative and positive critical discharge voltage magnitudes were -25.24 kV and 24.93 kV, respectively.

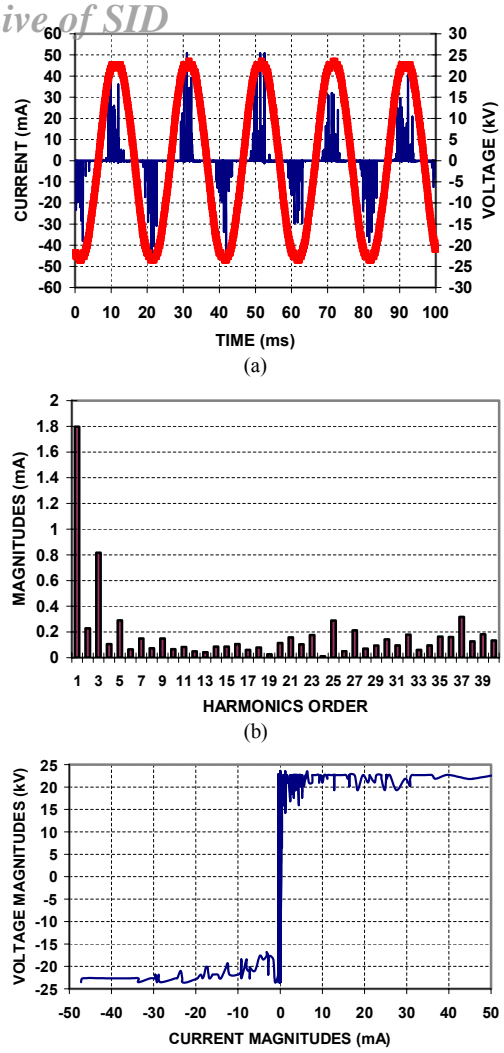


Fig. 3. The discharge current characteristics on 23.5 kVmax and -19 kPa for applied voltage and pressure reduction; (a) discharge current and applied voltage waves, (b) discharge current harmonics spectrum, and (c) V-I characteristics.

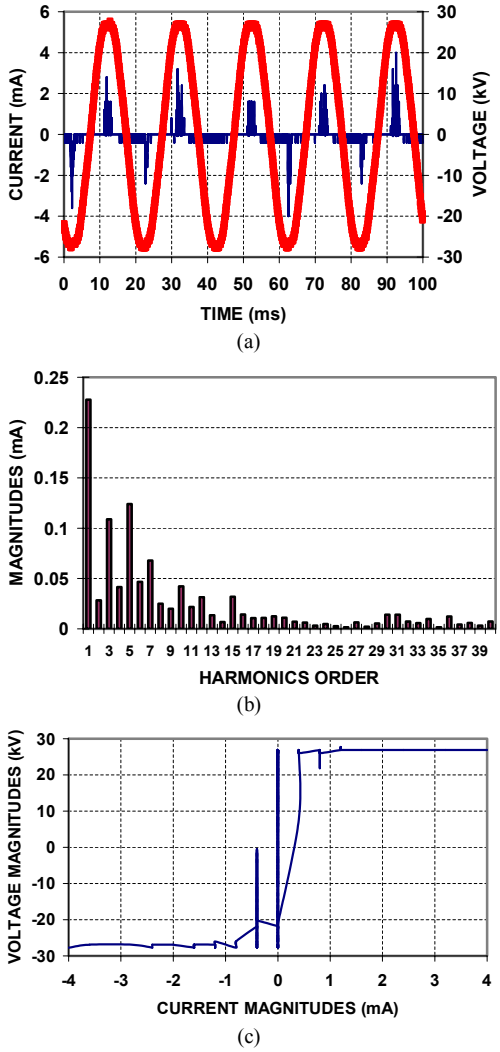


Fig. 4. The discharge current characteristics on 27.7 kVmax and +19 kPa for applied voltage and pressure addition; (a) discharge current and applied voltage waves, (b) discharge current harmonics spectrum, and (c) V-I characteristics.

Fig. 3(a) shows the discharge current and applied voltage waveforms on the condition of 23.5 kV_{max} and -19 kPa for the applied voltage amplitude and the pressure reduction respectively. Fig. 3(b) shows the corresponding harmonics. The fundamental, third and fifth harmonics were 1797 μA, 816 μA and 291 μA respectively. The percentages of the third and fifth harmonics on the fundamental, significances, were 45.4% and 16.2% respectively and the THD was 53.8%. Fig. 3(c) shows the relation between discharge current and applied voltage magnitude chart. The property of discharge was more drastically non-linear than that the previous one. The negative and positive averages of critical discharge voltage magnitude were -22.45 kV and 22.04 kV respectively.

Moreover, Fig. 4(a) shows the discharge current and applied voltage waves on 27.7 kV_{max} and +19 kPa for the applied voltage amplitude and the pressure addition respectively. Fig. 4(b) shows the corresponding harmonics and the fundamental, third and fifth harmonics were 228 μA, 109 μA and 124 μA respectively. The percentages of third and fifth harmonics on the fundamental were 47.8% and 54.4% respectively and the THD was 90.8%. The significant amplitudes were fifth, third, seventh, sixth and tenth harmonics after the fundamental. Fig. 4(c) shows the corresponding discharge current and applied voltage magnitude chart. The property of discharge was considerably less non-linear than that the previous ones. The negative and positive average critical discharge voltage magnitudes were -27.02 kV and 26.82 kV respectively.

These figures indicate that the pressure had an important role on an electrical discharge. On the atmospheric pressure, the third harmonics of discharge current was significantly dominant after the fundamental. Nevertheless, the remaining odd harmonics were also dominant, mainly eleventh, ninth and seventh harmonics. First case was different from the lower pressure one, as an example on 19 kPa under the atmospheric pressure. On the low pressure, the third harmonics of discharge current was more dominant than that the atmospheric pressure. It was also the highest amplitude among remaining harmonics, except the fundamental. The thorough discharge current amplitude enhanced significantly, more than five times from the first. The V-I characteristics was considerably more non-linear than the first. The averages of critical discharge voltage magnitude were considerably lower than the first.

On the contrary, in the higher pressure, as an example

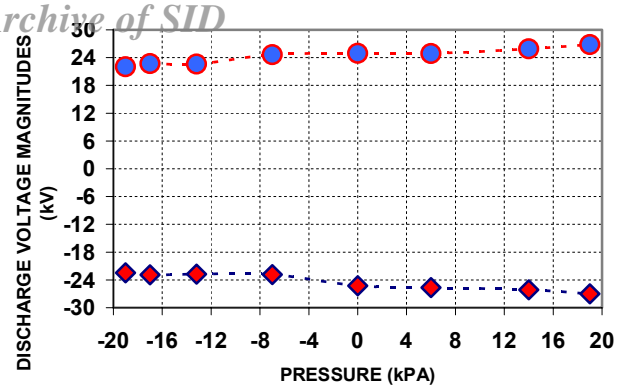


Fig. 5. Discharge voltage magnitude versus pressure.

on 19 kPa upper the atmospheric pressure, the third harmonics was significantly less than the previous ones and the fifth harmonics. The discharge current amplitude was significantly lower and the V-I characteristics was also less non-linear than the previous ones. Therefore, the role of low pressure is very important to create an initial discharge. On the low pressure, the electron on the insulator specimen surface was easier to be released (≈ ionized) as subjected by a sufficient high voltage. This case was also a representation, that if an insulator is installed on a high land, where the atmospheric pressure reduces, it will tend to be discharged, as an initial fail condition.

Fig. 5 shows the average of critical discharge voltage magnitudes as function of pressure. The critical positive discharge voltage magnitude would considerably rise as the pressure increased. This case was similar as the negative one. Therefore, the critical discharge voltage magnitude would reduce as the pressure decreased to tend to a vacuous condition. In a low pressure, it needed a slightly low applied high voltage to discharge the specimen, which meant that the electron tended to be easier to discharge when subjected by a high voltage.

The third harmonics were usually dominant among harmonics, especially on the low pressures, so that the discharge currents were far away from the pure sinusoidal form. These phenomena were indicated by discharge current waveforms and the harmonics spectrum or high THDs. Usually, the fronts of discharge current waves were suppressed to the centre. After reach the peaks, the waveforms were not suppressed. These cases indicated that to be discharge, it required applied voltage magnitude thresholds.

Those phenomena were suitable as the Vosloo's proposal, a leakage current just before discharge [23], as shown in Fig. 6(a). If this wave is compared to the above experimental results, or Fig. 6(b), those figures resembled the proposed waveform theory.

Fig. 7 shows the positive and negative peaks of discharge currents versus the pressure experimentally. Actually, the peaks of discharge current, whether positive or negative, were occurred in intermittent. So those, in the experiment, the peak values were obtained randomly. The discharge current peaks, besides depended on pressure, they also depended on applied voltage magnitude, pollutant, leakage distance, form factor, environmental condition and so on. However, it was emphasized on the pressure effects.

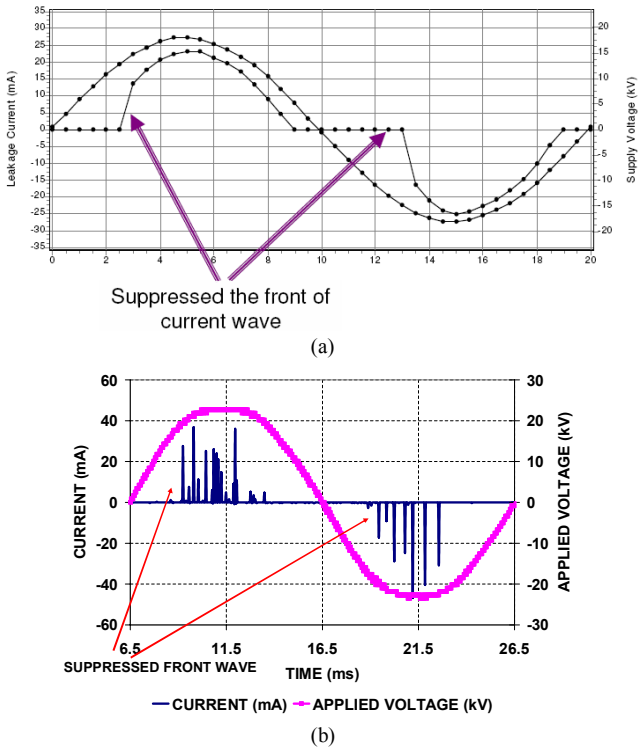


Fig. 6. The Vosloo's leakage current theory and experimental discharge current waveform; (a) Vosloo's proposed leakage current and (b) experimental discharge current.

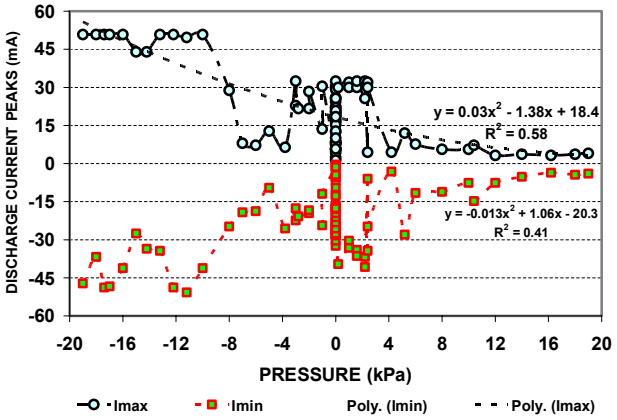
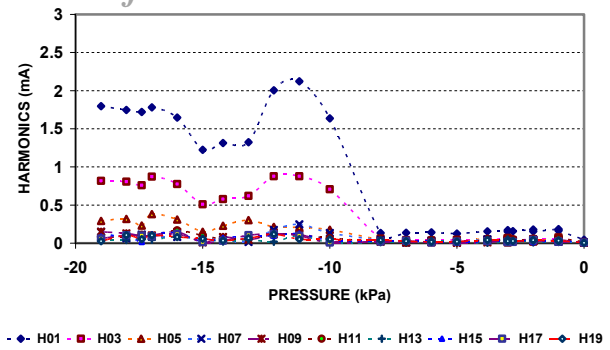


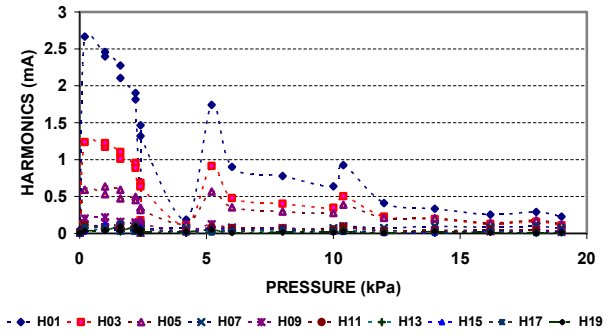
Fig. 7. The positive and negative discharge current peaks vs. pressure.

The discharge current peaks would significantly decrease as the pressure increased. The chart tended to be fairly hyperbola, where the empirical equations are shown. Therefore, the role of atmospheric pressure is very important on the discharge current peaks. On the low pressures, as high land representation of insulator installation, the discharge current amplitudes will be higher. For an example, if an insulator installation on 870 meter above sea level, the discharge current amplitude will be around twice.

Fig. 8 shows the odd harmonics of discharge current versus the positive and negative pressures. It indicates that the harmonics would reduce significantly as the pressure increased. The reducing phenomena were hyperbola. Nevertheless, the slopes were different, where on the negative values, they were more drastic than those on the positive ones. Furthermore, the harmonics tended to be constant values. Usually, the harmonics would be smaller as the harmonics order increased.



(a)



(b)

Fig. 8. The Odd harmonics vs. (a) positive and (b) negative pressures.

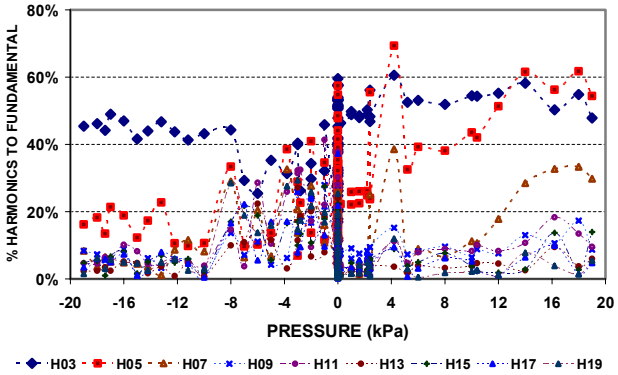


Fig. 9. The odd harmonics percentages on fundamentals vs. positive and negative pressure.

For further analysis, Fig. 9 shows the percentages of odd harmonics to the corresponding fundamentals of discharge currents versus positive and negative pressures. The charts tended to very slightly increase. This case means that the harmonics comparisons to the corresponding fundamental would fairly constant as the pressure increased The third harmonics were most significantly influenced by the pressure. On the low pressures, they would increase drastically as the pressure reduced. On the contrary, on the high pressures, they would significantly reduce as the pressure increased. Nevertheless, the harmonics percentages on the corresponding fundamentals tended to be fairly constant. This case indicated that the harmonics increased as a follower of the corresponding fundamentals.

Usually, the percentages of the harmonics on the corresponding fundamentals were represented by THDs. Fig. 10 shows the THDs versus both positive and negative pressures. The THDs would increase considerably as the pressure rose. This statement means that the fundamentals would slightlier increase rather than those increasing

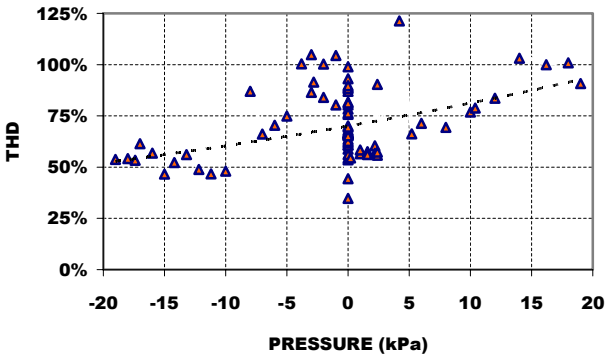


Fig. 10. THD vs. positive and negative pressures.

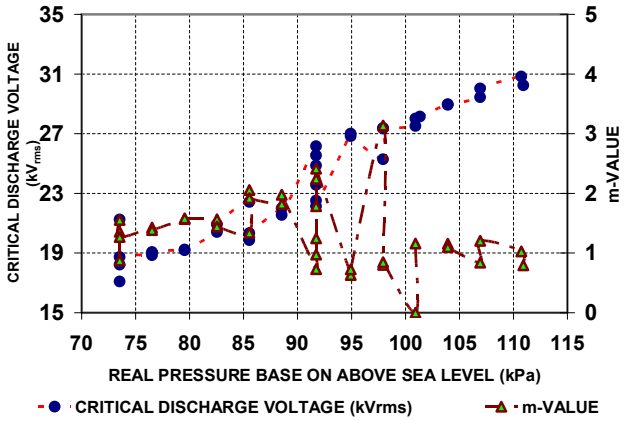


Fig. 11. The flash voltage vs. real pressure.

remaining harmonics on the corresponding fundamentals as the pressure increased.

The critical discharge voltages versus the pressures experimentally are shown in Fig. 11. The pressure was indicated by the digital manometer as positive, zero and negative values. Nevertheless, due to Bandung city is 768 m above sea level in average, the actual pressures had to be converted according to the pressure conversion table [24].

The critical discharge voltage would rise as the actual pressure increased. It was more difficult to be discharge as the pressure would be higher, and vice versa, as the pressure was lower, it would be easier to be discharge. In the real condition on sites, if a land of insulator installation increases above sea level, an insulator is relatively easier to be discharge or flashover occurrence than that on a lower place.

The atmospheric pressure is one of the factors that considerably influence the minimum flashover voltage of insulators. The relationship between the critical flashover voltage of polluted insulators and the air pressure was cited on the references [9], [14], [25], [26] as (1). Based on the sea level (0 meter), the actual atmospheric pressure is 101.33 kPa, so that m constant values were between 0.226 and 3.137, where m average value was 1.35. The exponent m was the constant value of which characterized by the influence of air pressure on the critical flashover voltage of insulators and depended on the several factors and parameters, including insulator profile, voltage polarity and pollution severity [11]. The atmospheric pressure has a definite effect on the AC minimum flashover voltage of insulators or specimens.

TABLE I
THE CORRELATION COEFFICIENTS OF DISCHARGE CURRENT HARMONICS, THD AND PRESSURE

	p	H01	H02	H03	H04	H05	H06	H07	H08	H09	H10	H11	H12	H13	H14	H15	H16	H17	H18	H19	H20	THD
P	1																					
H01	-.25	1																				
H02	-.23	.71	1																			
H03	-.19	.99	.68	1																		
H04	.01	.69	.77	.70	1																	
H05	.08	.84	.50	.90	.62	1																
H06	.15	.52	.41	.55	.74	.58	1															
H07	-.07	.44	.18	.47	.31	.54	.44	1														
H08	-.04	.50	.38	.51	.34	.46	.37	.39	1													
H09	-.11	.88	.61	.90	.62	.83	.50	.39	.51	1												
H10	-.04	.59	.41	.61	.43	.59	.44	.52	.68	.60	1											
H11	-.18	.68	.35	.72	.37	.75	.41	.49	.28	.74	.49	1										
H12	-.12	.56	.40	.57	.43	.52	.44	.46	.42	.45	.65	.43	1									
H13	-.23	.53	.27	.55	.29	.58	.27	.59	.31	.54	.46	.74	.34	1								
H14	-.35	.68	.50	.67	.50	.53	.45	.28	.38	.54	.46	.42	.78	.33	1							
H15	-.31	.62	.34	.64	.33	.60	.32	.55	.34	.62	.44	.63	.36	.72	.45	1						
H16	-.48	.61	.41	.59	.33	.43	.31	.33	.40	.53	.49	.46	.55	.45	.75	.47	1					
H17	-.35	.70	.49	.68	.46	.55	.41	.27	.27	.64	.33	.55	.38	.39	.48	066	.45	1				
H18	-.54	.57	.46	.53	.28	.32	.25	.35	.49	.50	.47	.41	.39	.39	.57	.48	.82	.48	1			
H19	-.45	.62	.38	.60	.35	.42	.29	.16	.25	.50	.28	.41	.32	.21	.55	.50	.52	.75	.74	1		
H20	-.52	.50	.45	.48	.37	.30	.34	.26	.37	.41	.45	.39	.47	.25	.58	.29	.71	.42	.77	.53	1	
THD	.45	-.55	-.40	-.49	-.20	-.25	.07	.02	-.08	-.36	-.13	-.20	-.17	-.18	-.31	-.25	-.33	-.32	-.33	-.30	-.28	1

TABLE II
THE GROUPING TABULATIONS OF THE CORRELATION COEFFICIENT (CC) FOR THE HARMONICS AND THD ON THE PRESSURE

CC≤-.5	-.5<CC≤-.4	-.4<CC≤-.3	-.3<CC≤-.2	-.2<CC≤-.1	-.1<CC≤0	0<CC≤.1	.1<CC≤.2	.2<CC≤.3	.3<CC≤.4	.4<CC≤.5
H18, H20	H16, H19	H14, H15, H17	H01, H02, H13	H03, H09, H11, H12	H07, H08, H10	H04, H05	H06	-	-	THD

Table I shows the correlation coefficients among the harmonics and pressure. The significantly influenced harmonics were first, second, third, eleventh, thirteenth fourteenth, fifteenth, sixteenth, seventeenth, eighteenth, nineteenth and twentieth. Generally, these harmonics would reduce as the pressure increased, and vice versa. Nevertheless, the THD would increase as the pressure rose. It means as the pressure rose, the discharge current waveforms would tend to be far away from the pure sinusoidal wave.

The highest correlation coefficient on the fundamentals was third harmonics. Thus, the fundamentals most significantly influenced the third harmonics, where the correlation coefficient was 0.99. The discharge current amplitudes were dominantly influenced by the third harmonics. The second and third highest correlation coefficients influenced by the fundamentals were ninth and fifth harmonics, where the correlation coefficients were 0.88 and 0.84 respectively. Almost harmonics had the negative correlation coefficients. Nevertheless, the THD had positive correlation coefficient, namely 0.45. As the pressures rose, the discharge current would be fairly far away from pure sinusoidal waveform. Although like this, the third harmonics would reduce as the pressure increased. The increasing THD due to the rising pressure was more dominantly caused by the increasing fundamental as slighter than the increasing remaining harmonics, although these harmonics increased too.

The tabulation for the table according to some groups of correlation coefficients is listed in Table II. It shows that the highest reciprocal influence on the pressure were 18th and 20th harmonics, as under -0.5. They were followed by 16th, 19th and 14th, 15th, 17th harmonics where the correlation coefficients lied on $-0.5<CC\leq-0.4$ and $-0.4<CC\leq-0.3$ respectively. Furthermore, the 1st, 2nd, 13th, and 3rd, 9th, 11th, 12th harmonics were lied on $-0.3<CC\leq-0.2$ and $-0.2<CC\leq-0.1$ respectively.

Although the 3rd harmonics were so fairly small effect on the pressure, actually it had high values after the fundamentals as the pressure reduced. This statement was clarified by the PCA scatter plot in Fig. 12, where the third harmonics (H03) were far away in opposition from the pressures (P). The third harmonics would increase as the pressure reduced, and vice versa. It is also revealed that the far opposing parameters to the pressure (P) were the first (H01), seventeenth (H17), nineteenth (H19), sixteenth (H16) and fifth (H05) harmonics. These harmonics were highly influenced by the pressure reciprocally, where those parameters would reduce considerably as the pressure increased. These properties were also supported by the correlation coefficients as shown above, where they had high negative values.

The THD closed to the pressure, where it would increase as the pressure rose. This means as the pressure rose, the discharge currents would be fairly far away from pure sinusoidal waveform. Although like this, the third harmonics would reduce as the pressure increased.

Discharge currents were different from leakage currents. The discharge currents had some unique properties, such as the amplitude was dominantly influenced by air pressure, intermittent occurrence, tended to be far from the sinusoidal wave, high THD (usually more than 50%), tended to be suppressed on the wave front due to the thresholds. The second highest harmonic was the third and its property was extremely non-linear. The discharge current amplitude, including the harmonics, would rise as the pressure reduce, tend to be hyperbola. On the other hand, a leakage current amplitude was dominantly influenced by high humidity and pollutant, occurred in continual/stable, tends to be close pure sinusoidal, low THD (usually lower than 50%), fifth harmonics as second highest and fairly linear property.

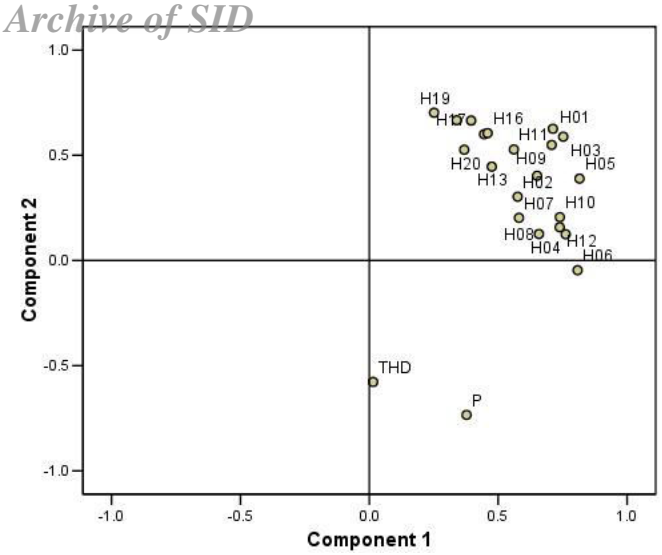


Fig. 12. The PCA scatter plot for the harmonics and THD on the pressure.

IV. CONCLUSIONS

Although the discharge current THD had very high values when low air pressures, they would increase as the pressure increased. These phenomena were caused more dominantly by the increasing first harmonics which were slighter rather than the increasing remaining harmonics, although these harmonics increased too.

Almost discharge current harmonics had negative correlation coefficients on the pressure. Nevertheless, the THD had 0.45 of correlation coefficient. This means as the pressure increased, the discharge currents were slightly far away from pure sinusoidal wave.

The discharge currents had some unique characteristics, such as the amplitude was dominantly influenced by air pressure, intermittent occurrence, tend to be far from sinusoidal wave, very high THDs (more than 50%), tend to be suppressed on the front of wave, due to the threshold values of applied voltage magnitudes, third harmonics as second highest and extremely non-linear V-I characteristics. The non-linearity would be more visible as the pressure reduced.

ACKNOWLEDGMENT

Authors herewith respectfully offer thanks to *Riset KK-ITB* research project for supporting the research.

REFERENCES

[1] Fernando, M. A. R. Manjula, and Gubanski, *Performance for Non-ceramic Insulators in Tropical Environments*, Ph.D. Dissertation, Department of Electric Power Engineering, Chalmers University of Technology, Goteborg-Sweden, pp. 1-2, 1999.

[2] B. Zegnini, d. Mahia, and J. M. Vega, "Modeling AC arcs developing along electrolytic surfaces simulating practical polluted insulator using an original laboratory model," *Int. J. of Applied Engineering Research*, vol. 2, no. 1, pp. 109-124, 2007.

[3] L. L. Alston and S. Zoledziowski, "Growth of discharges on polluted insulators," *IEEE Proceedings*, vol. 110, no. 7, pp. 1260-1266, Jul. 1963.

[4] B. F. Hampton, "Flashover mechanism of polluted insulation," *IEE Proceedings*, vol. 111, no. 5, pp. 531-532, 1964.

[5] R. Wilkins, "Flashover of high voltage insulators with uniform surface pollution films," *IEE Proceedings*, vol. 116, no. 3, pp. 457-467, 1969.

[6] A. M. Rahal and C. Huraux, "Flashover mechanism of high voltage," *IEEE Trans. on Power Apparatus and Systems*, vol. 98, no. 6, pp. 2223-2231, Nov. 1979.

[7] S. Gopal and Y. N. Rao, "Flashover phenomena of polluted insulators," *IEE Proceedings*, vol. 131, pt. C, no. 4, pp. 140-143, Jul. 1984.

[8] S. Hesketh, "General criterion for the prediction of pollution flashover," *IEE Proceedings*, vol. 114, no. 4, pp. 985-990, 1967.

[9] Y. Mizuno, H. Kusada, K. Naito, "Effect of climatic conditions on contamination flashover voltage of insulators," *IEEE Trans. on Dielectrics and Electrical Insulation*, vol. 4, no. 3, pp. 286-289, Jun. 1997.

[10] T. Kawawura, M. Ishii, M. Akbar, and K. Nagai, "Pressure dependence of DC breakdown of contaminated insulators," *IEEE Trans. on Electrical Insulation*, vol. EI-17, no. 1, pp. 39-45, Feb. 1982.

[11] M. Farzaneh, J. Zhang, M. Frechette, T. Sakakibara, and E. Da Silva, "Effects of high altitude and atmospheric icing on the performance of outdoor insulators," in *Proc. IEEE PES Transmission and Distribution Conference and Exposition*, 6 pp., Caracas, Venezuela, Aug. 2006.

[12] O. Kalenderli, E. Onal, A. Merev, and K. Mardikyan, "Impulse flashover voltages in air at low pressure," in *Proc. XIIIth Int. Symp. on High Voltage Engineering*, Netherland, 2003.

[13] V. M. Rudakova and N. N. Tikhodeev, "Influence of low air pressure on flashover voltages of polluted insulators: test data, generalization attempts and some recommendation," *IEEE Trans. on Power Delivery*, vol. 4, no. 1, pp. 607-613, Jan. 1989.

[14] H. P. Mercure, "Insulator pollution performance at high altitude major trends," *IEEE Trans. on Power Delivery*, vol. 4, no. 2, pp. 1461-1468, Apr. 1989.

[15] N. D. Megriche, A. Beroual, "Flashover dynamic model of polluted insulators under ac voltage," *IEEE Trans. on Dielectrics and Electrical Insulation*, vol. 7 no. 2, pp. 283-289, Apr. 2000.

[16] OriginLab Co., *Origin V75 User's Manual*, OriginLab Corporation, pp. 601-611, MA, USA, 2003.

[17] Suwarno, "Leakage current waveforms of outdoor polymeric insulators and possibility of application for diagnostics of insulator conditions," *J. of Electrical Engineering & Technology*, *The Korean Institute of Electrical Engineering*, vol. 1, no. 1, pp. 114-119, 2006.

[18] T. W. Anderson, *An Introduction to Multivariate Statistical Analysis*, Second Edition, John Wiley & Sons, pp. 18,489, 1984.

[19] J. Whittaker, *Graphical Models in Applied Multivariate Statistics*, John Wiley & Sons, pp. 17,48-51, 1996.

[20] A. Hannawati, Thiang, Y. Prasetyo, "Odor recognition dengan menggunakan principal component analysis and nearest neighbour classifier," in URL: *http://puslit.petra.ac.id/journals/electrical*, accessed on Dec. 1, 2007.

[21] K. V. Mardia, J. T. Kent, and J. M. Bibby, *Multivariate Analysis*, Academic Press, London, UK, pp. 213-228, 2000.

[22] Lab. of Industrial System on Optimization and Planning (LISOP), *Handout Multivariate Analysis, Seminar and Workshop*, Industrial Engineering ITB, Mar. 2007.

[23] ,L. W. Vosloo, *A Comparison of the Performance of High-Voltage Insulator Materials in a Severely Polluted Coastal Environment*, Ph.D. Dissertation, Department of Electrical and Electronic Engineering, University of Stellenbosch, South Africa, pp. 15-18, Mar. 2002.

[24] In URL: http://www.engineeringtoolbox.com/air-altitude-pressure-d_462.html, access on March 21, 2009.

[25] Sundararajan and Nowlin, "Effect of altitude on the flashover voltage of contaminated insulators," in *Proc. of IEEE Annual Conf. on Electrical Insulation and Dielectric Phenomena*, vol. 2, pp. 433-436, San Fransisco, US, 1996.

[26] L. Shu, X. Jiang, C. Sun, Y. Tian, M. Farzaneh, Y. Li, and J. Zhang, "AC Flashover performance of artificial iced and polluted insulators at high altitude districts," in *Proc. of 13th Int. Offshore and Polar Engineering Conf.*, pp. 403-408, Honolulu, Hawaii, US, May 2003.

Waluyo was born in Magelang, Central Java, Indonesia, on January 2, 1969. He received his B.Sc. and M.Sc. from Bandung Institute of Technology (ITB). Currently, he is a doctoral student at School of Electrical Engineering and Informatics, Bandung Institute of Technology (ITB) and an Associate Professor of National Institute of Technology (Itenas) Bandung, Indonesia. His research interest is in high voltage engineering.

Ngapuli Irmea Sinisuka was born in Indonesia, in 1950. He received his B.Sc. from ITB and M.Sc., and Ph.D. from Electronique, Institute National Polytechnique De Grenoble, France and Electronique, Electrotechnique, Automatique, Universite Paul Sabatier-Toulouse III, France, respectively. Currently, he is a Full Professor at School of Electrical Engineering and Informatics, ITB, Indonesia. His research interest is in electrical high voltage materials.

Suwarno was born in Indonesia, in 1965. He received his B.Sc. and M.Sc. from ITB, Indonesia, and his Ph.D. from Nagoya University, Japan. Currently, he is a Full Professor at School of Electrical Engineering and Informatics, ITB, Indonesia. He is a member of IEEE. His research interest is in electrical high voltage materials.

Maman Abdurahman Djauhari was born in Indonesia, in 1949. Currently, he is a Full Professor at Department of Mathematics, Faculty of Science, UTM Malaysia. He is interested in He received his B.Sc. from ITB, Indonesia, and his and M.Sc. and Ph.D. from Universite de Montpellier, France. His research interests are in multivariate and robust statistics.