Hooghly Engineering & Technology College

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BOOKS & CONFERENCE PAPERS

Frontiers of ICT in Healthcare pp 251–263

A Smart System for Assessment of Mental Health Using Explainable AI Approach

Sirshendu Hore, Sinjini Banerjee & Tanmay Bhattacharya

Conference paper | First Online: 25 April 2023

Part of the Lecture Notes in Networks and Systems book series (LNNS,volume 519)

Abstract

Speech emotion recognition (SER) is a popular area of research, and its presence has been observed in various sectors including the smart healthcare system. An SER-enabled smart health system may facilitate the medical practitioners to improve the diagnosis process, by incorporating patient mental health. This is particularly vital in a pandemic/adverse situation when people especially

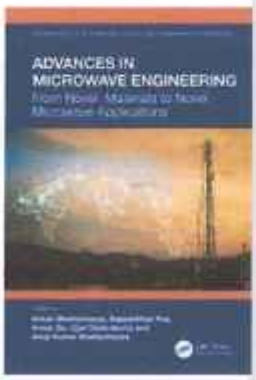
1st Edition

Advances in Microwave Engineering

From Novel Materials to Novel Microwave Applications

Edited By Ankan Bhattacharya, Bappaditya Roy, Arnab De, Ujjal Chakraborty, Anup Kumar Bhattacharjee

ISBN 9781032468983
456 Pages 205 Color & 28 B/W Illustrations
November 21, 2023 by CRC Press



COMING SOON

Description

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Microstrip Antennas: Theory, Principle and Review of Literature

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COMING SOON

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Biography

Dr. Ankan Bhattacharya

Ankan Bhattacharya obtained B.Tech. and M.Tech. degrees in Electronics & Communication Engineering from West Bengal University of Technology, Kolkata, India. He completed his Ph.D. from National Institute of Technology, Durgapur, India. He is the author of several research papers which have been published in many reputed journals and Conferences of National and/or International levels. Dr. Bhattacharya is a Life-Member of Forum of Scientists, Engineers & Technologists (FOSET), Member of Institution of Engineers India (IEI) and Member of International Association of Engineers (IAENG). His areas of research are Antenna Engineering, Computational Electromagnetics, Electronic Circuits and Systems, Signal Processing, Microwave Devices and Wireless Communication Technologies. He is also an Editor/Reviewer of many National/International journals of repute. He has organized/participated in many National/International Conferences, Seminars, Workshops and Webinars. Dr. Bhattacharya has been active in delivering Invited Talks and has also been a part of many National/International Conferences in the capacity of Coordinator, Session Chair, Technical Committee Member etc. Presently he is associated with Hooghly Engineering & Technology College (HETC), Hooghly, India as an Associate Professor of Electronics and Communications Engineering Department. Dr. Bhattacharya has been appointed as a Guest Editor of SN Applied Sciences, a multi-disciplinary, peer-reviewed journal of Springer Nature. He has also been inducted into the Editorial Board of Circuits and Systems journal, Scientific Research Publishing (SCIRP). Dr. Bhattacharya has been appointed as an Associate Editor of the "Journal of Information Processing Systems (JIPS)", an official international journal of the Korea Information Processing Society. (Indexed in Scopus and ESCI)

Dr. Bappadittya Roy

Bappadittya Roy obtained his Ph.D. degree in Electronics and Communication Engineering from National Institute of Technology, Durgapur, India. He is presently associated Vellore Institute of Technology-AP University, Amaravati, India as a Senior Asst. Prof. of School of Electronics Engineering. He is a Senior Member of IEEE. He has received many national and international travel grants and has travelled abroad for seminars, conferences and workshops. He has published several articles in reputed journals and conferences. His research areas are microstrip antennas, fractal antennas and mobile communication. He is the General Co Chair AISP 22 IEEE conference. He is also a reviewer of many National/International journal submissions. Dr. Roy has been felicitated by VIT-AP University for his research publications and have received the best researcher award. He is now working as an Associate Professor (Sr. Grade) VIT-AP University since Jan 2022.

Ankan Bhattacharya

Urban Environment and Smart Cities in Asian Countries pp 263–281 | Cite as

Smart Cities and Associated Solid Waste, Biomedical Waste, E-Waste Issues, and Management

Subhadeep Biswas, Ankurita Nath & Anjali Pal

Chapter | First Online: 26 April 2023

Part of the Human Dynamics in Smart Cities book series (HDSC)

Abstract

The present chapter describes the uprising of the Indian smart cities in the last decade, along with the generation and management of special types of solid wastes with reference to the global scenario. The first few sections deal with the definition of a smart city, its relevance and

Optimal velocity profile identification of EV suited for standard driving cycles using PSO to reduce power requirement

1st Debolina Pradhan
Dept. of Electrical Engg.
Hooghly Engineering and Technology College
Hooghly, India
pradhan.debolina@gmail.com

2nd Chandan Jana
Dept. of Electrical Engg.
Hooghly Engineering and Technology College
Hooghly, India
chandan.jana@hetc.ac.in

3rd Mousumi Jana Bala
dept. of Electrical Engg.
Meghnad Saha Institute Of Technology
Kolkata, India
mjbala@msit.ac.edu

***Abstract*—The Ongoing demand of battery electric vehicle (BEV) for green energy revolution suffers from limited driving range and lack of charging stations as compared with traditional vehicles. Driving range of electric vehicle (EV) can be increased by reducing the peak power consumption which minimizes the energy requirement of BEV. The selection of electrical motor for BEV also depends on the peak power consumption by the motor to reach the maximum speed over a driving cycle. This paper proposes different acceleration strategies to reduce the peak power consumption for a 4 wheeler sedan which is being operated with fixed gear on Indian Driving Cycle (IDC) and Highway Fuel Economy Test (HWFET) driving cycle. Particle Swarm Optimization technique (PSO) has been adopted to find the minimum power requirement to reach optimal velocity.**

***Index Terms*—EV, Driving cycle, Acceleration**

I. Introduction

With the aim of reducing greenhouse gas emission, conquer the increase in international oil prices, and conservation of conventional energy resources the footstep of world automobile market has been changed [1]. To accomplish the requirement, automakers of the world have made effort to build up eco-friendly vehicles which use electric power replacing the IC engine based vehicle powered by fossil fuel like gasoline, petroleum, and diesel. Most of the electric vehicle uses Li-ion battery [2] technology for longer life of their vehicle. The utmost problem to enforcement the electric vehicles is limitations of operating range [3], [4] and immense charging time [5]. But in EV electric motors like induction motor, permanent magnet synchronous motor [6] are used to drive the vehicle which may offer wide range of speed and torque variations [7]. So the transmission efficiency is improved as the EV is operated with a fixed gear ratio [8] [9]. The maximum speed can be reached with conventional four wheeler with sequence of gear changes as per standard Indian driving cycles [10] [11]. In our proposed work, a fixed gear four wheeler sedan having the maximum speed of 90 km per hour and 42 km per hour operated on HWFET and IDC driving cycles respectively has been considered. The maximum speed can be attained by Electric Vehicles by changing its acceleration smoothly in different ways resulting minimum power requirement. Reduced peak power helps to select comparatively low kW motor for same desire output resulting cost minimization. Here, three different strategies of acceleration changes have been proposed for plane road and the road with ten degree gradient. Particle Swarm Optimization technique [12], [13] has been applied for HWFET and IDC Standard driving cycle[14]. Simulation results and mathematical expressions are given to validate the proposed technique of optimization.

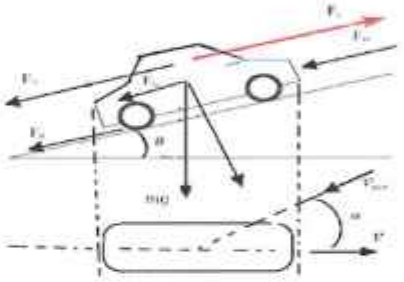

Fig. 1. Vehicle dynamics on inclined road with air flow.

II. VEHICLE DYNAMICS

Proper modeling approach of various system parameters is essential to evaluate the performance of EV. Vehicle dynamics is considered for the calculations of required power, speed, torque, and energy required while the vehicle is in motion. The tractive force (F_T) required to keep a vehicle in motion consists of aerodynamic drag (F_D), rolling resistance force (F_R), climbing force (F_G) and accelerating force (F_A) as shown in Fig. 1.

$$F_T = F_D + F_R + F_G + F_A \tag{1}$$

Chandan Jana

Dynamical behaviour in a peak ripple based V^2 controlled buck converter

Shilpi Saha
Department of Electrical Engineering
Hooghly Engineering and
Technology College
Hooghly-712103, W.B, India
shilpi.saha2008@gmail.com

Sukanya Parui
Department of Electrical Engineering
IIEST, Shibpur
Howrah-711103, W.B, India
sparui@ee.iiests.ac.in

***Abstract*— In this paper the dynamical behaviour has been explored in V^2 controlled buck converter. This V^2 modulation method basically falls under ripple based control methods as output ripple voltage is used to control the converter. Mathematical model has been derived using state space equations. The bifurcation phenomena have been studied. The dependency of the system behavior on the variation of its parameters has been explored and the parameter space diagrams have been obtained. Dependency of the converter operation on effective series resistance (ESR) of the output capacitor has also been explained. This study is immensely helpful for the design and operation of converter.**

Keywords*— *nonlinear-dynamics, bifurcation, chaos, peak V^2controller,

I. INTRODUCTION

In power electronic switching converter, we often encounter some typical nonlinear phenomena like chaos, bifurcation, oscillation [1-4]. For designing a switching converter, intense study and analysis in the field of nonlinear dynamics are very much beneficial. Adequate knowledge about nonlinear dynamics (like bifurcation, chaos) help anyone to understand and visualise the character of the system as certain parameters are varied. Furthermore, a complete information in the field of bifurcation and chaos in the parameter space is important as it will help us to choose the parameter values in order to obtain the desirable behaviour. Control methods always play a significant role for achieving desired results. During the last few decades, lots of research work have been done on conventional modulation methods like voltage mode control and current mode control [5-8].

Efficiency of a switching converter always depends on the controller action and V^2 control topology was proposed [9] due to its fast transient response. In [10], the authors show that V^2 control provides better transient response rather than voltage mode and current mode controller. Intense study has been done on different types of ripple based controllers [11-12]. A voltage mode [14] and current mode [13] controlled buck converter fed from different types of input also encounter bifurcation phenomena. Nonlinear behaviour of a peak V^2 and valley V^2 controlled converter have been explained in [15] and [16] respectively.

II. SYSTEM DESCRIPTION

A peak V^2 controlled buck converter is depicted in Fig 1. In this modulation method, we consider two loops. In the outer loop or also known as slow loop of the controller, load voltage V_o is sensed and an error signal V_{error} is produced after comparing with the reference voltage V_{ref} and in the inner loop, also known as fast loop, gate signal for the switch is generated by correlating V_{error} and output ripple voltage V_{ripple}. The control logics are as follows: when V_{ripple} reaches the value of V_{error}, output of the SR latch will be low i.e., the switch S becomes off until next clock pulse arrives and as long as $V_{ripple} < V_{error}$ the switch operates in on state.

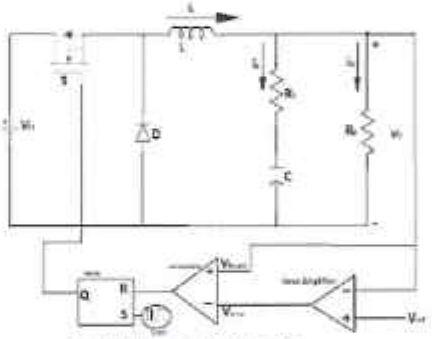

Fig. 1. Buck converter with V^2 controller

Under the consideration that if R_E = ESR of the output capacitor (R_E), then most of the ripple current of inductor will pass through the filter capacitor. V_{ripple} is basically ripple voltage across the R_E as the capacitor ripple is negligible due its small value.

i_L (inductor current) and v_c (capacitor voltage) are state variables of the system.

The governing equations for on state and off state of switch S and diode D are mention below

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ID – 40

Influence of Machining Parameters on Turning Al-Mg_2Si-Si Composite

Dipanwita Biswas[1], Ananya Banerjee[2], Santanu Das[3] and Prosenjit Das[4]

[1]Department of Mechanical Engineering, Hooghly Engineering Technology College, Hooghly- 712103, West Bengal, India
[1,2]Department of Mechanical Engineering, Kalyani Govt. Engineering College, Kalyani, Nadia- 741235, West Bengal, India
[4]Department of Materials Engineering, Indian Institute of Science, Bangalore-560012, INDIA
Email: [1]dipanwita7.biswas@gmail.com, [2]anaban2020@gmail.com, [3]sdas.me@gmail.com, [4]prosenjitdas@iisc.ac.in

Introduction

Improvement of manufacturing is concerned with achieving good quality of a product taking less time maintaining economy. High speed machining with coated carbide cutting tools can be used to provide good quality in certain situations [1]. High production rate machining gives high MRR to have favourable chip formation, desired surface quality and also reduces the cutting force [2]. During dry turning, performance of tool insert is analyzed [3]. Comparative analysis of tool inserts performance of the newly developed Al-Mg_2Si-Si composite [4]. This study uses SNMG-120408-1025 narrow groove inserts to perform turning tests on Al-Mg_2Si-Si composite specimen under dry condition.

Keywords: Machining, Turning, machinability, MMC, composite, Al-Mg_2Si-Si Composite.

Experimental details

A 11kW NH-22 HMT lathe has been used in this experiment. A 3-jaw chuck and revolving center is used to hold Al-Mg_2Si-Si workpiece. A detailed description of both the setup and experimental conditions can be found in Table 1 and Table 2.

Table 1: Experimental set up

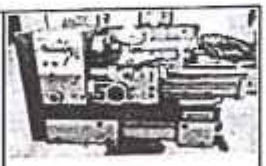
Machine tool	Model: NH22 Motor kW: 11	
Workpiece	Dia -78mm, L – 165mm, Hardness – 115 VHN	
Insert	SNMG-120408-1025 (With chip breaking groove)	
Condition	Dry	

Table 2: Experimental Condition

Cutting Velocity (V_c) in m/min	Feed (S_o) in mm/rev	Depth of Cut (t) in mm
100, 118, 160, 202, 220	0.06, 0.08, 0.1. 0.12, 0.16	3.0

Dipanwita Biswas

Characterization and Modeling of Viscoelastic Materials

Smitadhi Ganguly, Department of Mechanical Engineering, Hooghly Engineering and Technology College, Chinsurah, West Bengal, India
Arghya Nandi and Sumanta Neogy, Department of Mechanical Engineering, Jadavpur University, Kolkata, West Bengal, India

Introduction

Viscoelastic materials are mainly polymers or polymer composites and are frequently used for their particular physical and damping properties. These materials have characteristic thermal features, mechanical properties and viscoelastic properties which can be varied significantly by altering their microstructure through addition of nanoparticles. Viscoelastic damping is associated with polymers and polymer-matrix composites which are termed as viscoelastic materials, linear or nonlinear. The response of such a material is a combination of long term fluid-like viscous behavior and short term typical elastic behavior. The stiffness and strength of elastic materials is often demonstrated by a stress–strain curve, which is obtained by applying a constant rate of strain to a bar of the material. When viscoelastic materials are tested and described, it is preferable to apply a step strain or step stress in time rather than a constant rate of strain because the effect of time can then be isolated from any sort of nonlinearity. The response to a step strain is termed stress relaxation, and the response to a step stress is known as creep.

Viscoelastic Material Characterization

The complex modulus of viscoelastic materials is sensitive to changes in frequency and temperature. Viscoelastic properties may be determined through dynamic testing of materials at discreet frequencies and temperatures. Since it is impossible to test a viscoelastic material at all combinations of frequency and temperature, a parametric relationship is developed from experimental data to characterize the material at all other combinations of frequency and temperature. This process is referred to as characterization.

Experimentally, one tries to characterize materials by performing simple laboratory tests from which information relevant to actual conditions can be obtained. In the case of viscoelastic materials the most commonly performed tests are: creep, stress relaxation, and dynamic (sinusoidal) loading. It is more difficult to characterize viscoelastic materials than other structural materials like metals. This is due to two factors. Firstly when a typically viscoelastic material is dynamically loaded it is necessary to measure both the energy storage property (storage modulus) and energy dissipation property (loss modulus), even within its linear range. Secondly both storage modulus and loss modulus tend to vary significantly with frequency as well as temperature. Both problems are addressed by describing the mechanical properties of the material in terms of the frequency and temperature dependent complex modulus, whose real and complex parts are the storage modulus and loss modulus.

The dynamic mechanical analyzer (DMA) is the general name given to an instrument that mechanically deforms a sample and measures the response of the sample. The deformation can be applied sinusoidally, in a constant (or step) fashion or under a fixed rate. The response to the deformation can be monitored as a function of temperature or time. Some common experiments employed are the creep and stress relaxation tests and frequency sweep test. The first two experiments record the response over time (transient test) whereas the third experiment records the response to dynamic loading over varying frequency (rate of deformation).

Stress Relaxation Test

In a stress relaxation experiment, the polymer is subjected to a constant strain at time zero and the resultant stress is measured as a function of time.The stress initially spikes up and slowly decreases or relaxes. In the ideal case, the response can be represented as a dashpot and spring in series. The displacement initially stretches the spring, resulting in the stress. Over time, the force recedes as the dashpot moves.

Creep Test

Creep is a progressive deformation of a material under constant stress.At time zero, we hang a weight to a viscoelastic rod, and record its elongation as a function of time. Thus, the stress in the rod is a step function of time, but the strain is an increasing function of time, with the following characteristics:

- *Unrelaxed strain,* ϵ_U: Instantaneously after we hang the weight to the rod, the rod elongates by a certain amount. The molecules are not in a state of thermodynamic equilibrium, and will move to attain a state of equilibrium.
- *Relaxed strain,* ϵ_R: After some time, the molecules reach a new state of equilibrium, and the strain no longer changes with time. This behavior is different from any liquid, which will flow indefinitely under a constant stress.
- *Relaxation time,* τ: The time needed for the rod to change from the old to the new state of equilibrium.

Explainable AI: Foundations, Methodologies and Applications pp 185–209

A Smart System for the Assessment of Genuineness or Trustworthiness of the Tip-Off Using Audio Signals: An Explainable AI Approach

Sirshendu Hore ✉ & Tanmay Bhattacharya

Chapter | First Online: 20 October 2022

Part of the Intelligent Systems Reference Library book series (ISRL,volume 232)

Abstract

Assessment of the genuineness or trustworthiness of a Tip-off is a challenging research area as it depends on the mental state and perception of the Tip-off providers. Thus, in the proposed work an attempt has been made to help the Law Enforcement (LE) personnel to assess the legitimacy of a Tip-off from a

Chapter contents | Book contents

Outline

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Keywords

1. Introduction

2. Sewage sludge: A civilization run-offs

3. Introduction and accumulation of HM in SS

4. Conventional sludge treating technologies

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Development in Waste Water Treatment Research and Processes

Treatment and Reuse of Sewage Sludge: An Innovative Approach for Wastewater Treatment

2022, Pages 243-265

14 - Natural zeolite: A feasible option for treating heavy metal-contaminated sewage sludge compost

Soumya Banerjee [a], Anoar Ali Khan [b]

https://doi.org/10.1016/B978-0-323-85584-6.00015-7

Abstract

Usage of sewage sludge (SS) as compost in agriculture has been one of the

Role of algal-bacterial association in combined wastewater treatment and biohydrogen generation: An overview on its challenges and future

Soumya Banerjee[a] *and Anoar A. Khan*[b]

[a]Department of Basic Science and Humanities, Hooghly Engineering & Technology College, Chinsurah, West Bengal, India [b]Chemical Engineering Department, Vignan's Foundation for Science, Technology & Research, Vadlamudi, Guntur, Andhra Pradesh, India

22.1 Introduction

Urbanization and exploitation of natural resources is a parallel endeavor which cannot be interrupted otherwise. In most of the cases this dual act had cost a lifetime and recovering from the crisis was found to be more difficult. The major outcomes of such anthropogenic acts are pollution which is now evident from the study reported on environmental health. Apart from ecological contamination, these activities are also creating huge impact on natural resources since most of them are depleting and can result in geographical makeover in near future. A single source of waste discharge can spread gradually within the physical and living communities of nature leading to deterioration of its quality. Thus, recent researches are focusing more on deriving sustainable solutions which might overcome both degrading environmental quality and depletion of natural resources like crude fuel.

22.2 Unscientific discharge of effluents: A serious environmental issue

Environmental pollution is an inescapable fact of today's world whose adverse effect is degrading the quality of life at a steady pace. This includes mostly the role of unwanted

Integrated Environmental Technologies for Wastewater Treatment and Sustainable Development
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Identification Tampering Image Using SIFT Descriptor

Debjani Chakraborty[1], Sandeep Choudhury[2], Sanjib kumar Dutta[3] and Biswajit Haldar[4]
Computer Science and Engineering
Narula Institute of Technology
Kolkata, India
Email: [1]debjani.csc@gmail.com, [2]Sandeepchoudhury.1983@gmail.com, [3]sanjibkr@gmail.com, [4]biswajithalder88@gmail.com

***Abstract*—In recent era, image tampering has become one of the threatening security problems in digital platforms. There are many software's available for tampering with an image that depicts as an original image. Some different tampering techniques are commonly used to hide important portions from an image or document, one very common practice is copy-move forgery that is quite impossible to distinguish with an open eye. Authentications of such images are an ardent research area in image processing and computer vision but still a challenging problem. This paper presents a method to identify image tampering that is based on SIFT (Scale Invariant Feature Transform) algorithm. SIFT descriptor is used to extract keypoint features from the input image and a hierarchical clustering algorithm is used to improve the accuracy of identifying the tampered location. The execution time of our proposed method is proportional to image resolution. If one portion of the image is copied and pasted on multiple locations on the same image, our proposed method can identify such occurrences. Finally, Homography is used to show the tampering points and their matching.**

***Index Terms*—tampering; SIFT; copy move forgery; clustering;**

I. Introduction

With expanding technological advancement digital image takes a vital role for many applications. At the same time digital image can be manipulated using different types of editing software, so, the probability of malicious changes on the image has increased. At present, image tampering detection method is more demanding in Digital Image Forensics (DIF), crime investigation, harassment, etc. With the advancement in image processing technology, this technique is used to find out the authenticity of a digital image. In the last one and half decade, DIF has gained more importance for analyzing the digital images for its modification among the research community [8]. There are different image editing software like Coral Draw, Photoshop by which one can copy any portion from an image and paste on another image and use rotation and scaling for better adjustment [1]. In copy-move image forgery, some important information could be hidden [1] and the false image looks like the original image and nobody can distinguish the differences with open eye. Area wise duplication is very common for image tampering, where a large portion of image pixel is copied and pasted on another location to hide unwanted object or content in the original image. In the fig. 1[a] there was a crow on the elephant. But the fig. 1[b] is a tampered image; here crow is omitted from the original one. For this reason, digital image verification becomes necessary for security. Generally two approaches have been used in digital image verification, first is active approach and another one is passive approach. Digital Watermarking or digital signatures are normally involved for active approach. But, passive approach is divided into three normal categories like Image Splicing, Image Retouching, and Copy-Paste [1]. The Copy-Move image Forgery Detection (CMFD) is not an easy task, because, that segment of image comes from the same image, so their characteristics like color and texture patterns are all compatible with the rest of the image. Passive CMFD experiments have been done by block-based forgery detection methods , based on discrete cosine transform (DCT) which was initially suggested by Fridrich in 2003[2], In this algorithm, the image is divided into overlapping blocks of fixed size and searched for the matching blocks. This assumption is made by the choice of a block, as it has less than the maximum size of the block, so computational cost becomes high. Popescu proposed a similar method [3], which used principal component analysis (PCA) instead of DCT in 2004[4]. The authors Weiqi Luo and others proposed a method to make the similarity that was more robust by calculating the component ratio for feature vector matching. But the main disadvantage is highly distorted images with the large smooth region which cannot be detected. In [5], Execution effort has been made to reduce time complexity by applying DWT (discrete wavelet transforms) in 2006[7]. Though these methods do not work in compressed image where time complexity is also high and it does not give better result for scaling, illumination and rotational images. Key-Point based passive techniques (SIFT) have been used to detect image tampering [8].

Patrick Niyishaka and others proposed digital image forensics technique by using DoG (Difference of Gaussian) and ORB (Oriented Fast and Rotated Brief) for Copy-Move Detection. This proposed technique shows somewhat better result but this method was not robust, and needed more effective result. Umair A. Khan, Mumtaz A. Kaloi, Zuhaib A. Shaikh, Adnan A. Arain also proposed a Hybrid Technique for Copy-Move Image Forgery Detection in 2018. Their proposed technique has further detected multiple instances of copy-move forgeries [11], but still there exists a gap of robustness, uniqueness, and speed. During our work, it was found that

Chapter

Nanomaterials for the Removal of Heavy Metals from Water

By Subhadeep Biswas, Mohammad Danish, Anjali Pal

Book Nanomaterials for Water Treatment and Remediation

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Pages	35
eBook ISBN	9781003118749

hexavalent chromium using bacteria

Soumya Banerjee[a], **Anoar Ali Khan**[b]

[a]*Department of Basic Science and Humanities, Hooghly Engineering & Technology College, Chinsurah, West Bengal, India,* [b]*Chemical Engineering Department, Vignan's Foundation for Science, Technology & Research (Deemed to be University) Vadlamudi, Guntur, Andhra Pradesh, India*

15.1 Preface

Sustainability and progression of a modern human civilization requires profuse supply of "raw materials." Among this "raw material," requirement of heavy metals is always high due to its crucial application in industrialization. Unfortunately, this march of exploitation of natural resources toward modernization and urbanization has resulted in fatality in terms of quality of environment and its strata. Once, these metal ions are mined then they will tend to pollute the natural resources until they are scientifically monitored. Various investigations have reported that the rate of heavy metal–led environmental pollution is steadily growing as their usage frequency is increasing gradually. Likely, in this parade of resourcing heavy metals, chromium is considered as one of the major contaminants due to its wide-ranging usage.

15.2 Chromium: An important or polluting heavy metal

15.2.1 Importance of chromium in human civilization

Chromium or *chroma* (as derived from Greek) is a heavy metal whose use and occurrence in nature is abundant. It is a transitional element as it can be seen in the periodic table. It is also included in the refractory metal category because of its higher melting point (1,772°C) than platinum. It is ranked 24th for its degree of abundance on earth crust. It occurs in three stable isotopes viz., ^{52}Cr, ^{53}Cr, and ^{54}Cr out of which ^{52}Cr is most abundant. In anthropogenic civilization, the use of chromium as an important heavy metal can be dated back to 259–210 BCE where this was used for coating weapons and

The Future of Effluent Treatment Plants: Biological Treatment Systems.
DOI: 10.1016/C2019-0-04851-0

Assessment of peak pressures and gust factors on surfaces of 'Z' shaped tall building under wind

Rajdip Paul[1a] and Sujit Kumar Dalui[2b]
[a] PhD Student, Indian Institute of Engineering Science and Technology, Shibpur, P.O.-Botanic Garden, Shalimar, West Bengal-711103, Howrah, India
[b] Assistant Professor, Indian Institute of Engineering Science and Technology, Shibpur, P.O.-Botanic Garden, Shalimar, West Bengal-711103, Howrah, India

ABSTRACT

This study investigates variations in peak pressures among different faces of a 'Z' shaped building model. Transient wind analysis is carried out, using numerical simulation technique. Maximum positive and minimum negative peak pressures for each face and the variation of gust factor (GF) along the vertical centre line of different faces of the building corresponding to 0^0 and 90^0 wind angle are presented. For the purpose, the CFD package of ANSYS-CFX is used. The length scale and velocity scale is considered as 1:300 and 1:5, respectively.

Keywords: Tall building, Peak pressure, Gust Factor, Vortex shedding,

1. INTRODUCTION

Tall flexible buildings are susceptible to vibrate with high frequency under lateral load in all the three directions (x, y and z) and shall be investigated to ascertain wind-induced oscillations or excitations in along-wind and across-wind directions. For buildings and closed structures with a height to minimum lateral dimension ratio of more than 5, or buildings and structures whose natural frequency in the first mode is less than 1.0 Hz; shall be examined for dynamic effects of wind (IS 875 (Part 3): 2015). Due to the complexity of the dynamic responses, physical modelling of fluid-structure interactions and numerical simulation using computational fluid dynamics (CFD) under simulated atmospheric boundary layer (ABL) are the only feasible means of obtaining exact information on wind loads (CWE-92 and CWE 96). Motions in the direction of the wind like buffeting are caused by fluctuating wind force associated with gust. The excitation depends on gust energy available at the resonant frequency. Again across-wind motions may be due to lateral gustiness of the wind, unsteady

[1] Corresponding author, E-mail: rajdippaul87@gmail.com

[2] E-mail: sujit_dalui@rediffmail.com

Finding of the Probable Size and Location of Distributed Generation in Unbalanced Distribution System with Demand Uncertainty

Chandan Jana
Dept. of Electrical Engineering
Hooghly Engineering and Technology College
Kolkata, India

Mousumi Jana Bala
Dept. of Electrical Engineering
Meghnad Saha Institute of Technology
Kolkata, India

Swapan Kumar Goswami
Dept. of Electrical Engineering
Jadavpur University
Kolkata, India

Abstract—This work predicts the capacity of a solar plant to be installed in an unbalanced distribution system in accordance with the transformation of energy. An optimal location of this DG has been suggested using particle swarm optimization technique. IEEE 34 node test feeder, which is unbalanced and radial, has been considered to verify the method.

Keywords— Distributed Generation, particle swarm optimization, Unbalanced distribution system

Nomenclature

i,j : Index of nodes

l : Line index

n : Number of lines

η : Efficiency of distribution system

$P_{i,sl}$: Spot load at i^{th} node

$P_{ij,dl}$: Uniform distribution of load along the line i—j.

$P_{grid,k}$: Power consumed by the system in k^{th} interval

$P_{l,k}$: Ohmic loss in the l^{th} line during k^{th} interval

I. INTRODUCTION

In last few couple of decades, DG penetration becomes a most emerging topic among the utility companies and researchers. Definition and introduction of DG has been mentioned in [1]. The merits of DG were elaborated in [2]. Different techniques have been suggested in different works for its size and position. A simplified technique has been suggested in [3]. Few such techniques have been used in [4], [5] and [6]. An algorithm has been described in [8] to find optimal position of DG. Besides, capacitor placement is primary concern in paper [9]. The authors in [11] have proposed an optimal size and location with an assumption that system is fully balanced. But, in this work exact system configuration which is unbalanced, has been considered. At present the position and capacity of DG are being analyzed with some objectives.

Here, the load throughout the day has been divided into three major categories—normal load, peak load and off-peak load. Again, these time zones have been divided into fifteen-minute intervals and active and reactive load demands in each interval are obtained from mean value and standard deviation of load demands in each time zone.

Load flow using backward and forward sweep method has been done without any DG to obtain node voltages and line losses for each interval and there from their mean values. Law of conservation of energy helps to get probable capacity of DG. An efficient optimization technique has been applied in finding out the suitable site for DG installation. Finally, the same method has been used to obtain same quantities with the system having DG only, placed at the position so obtained and results have been compared.

Problem Statement has been given in section II. Section III describes line and load model. Results, discussion and conclusions have been made in consequence sections

II. PROBLEM STATEMENT

Nowadays, deregulation in electricity market and environmental concern motivate utility companies to install renewable power plant. It requires to predict proper DG size and its position in the distribution system.

The distribution system considered here are consisting of

- Radial distributors with all possible line configurations
- All possible ac loads
- Concentrated and distributed type of loads which vary probabilistically

III. MODELING OF VARYING LOAD

For each time zone, active and reactive power in each interval are randomly generated using Matlab function from mean value and standard deviation of load demand as shown in Fig.2.

A. Load modeling

Distributed load in between two nodes are being halved and connected at two respective nodes. Total load at any node is

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Abstract

Traditional meta-heuristic optimization algorithms, such as the particle swarm optimization (PSO) algorithm, genetic algorithm (GA), and bat algorithm (BA) played a vital role to provide impressive near to the optimum solutions for linear/nonlinear complex problems in numerous applications. Nevertheless, in some case, such algorithms may suffer from becoming trapped in local optima with long computational time for convergence. Thus, in order to enhance a broader

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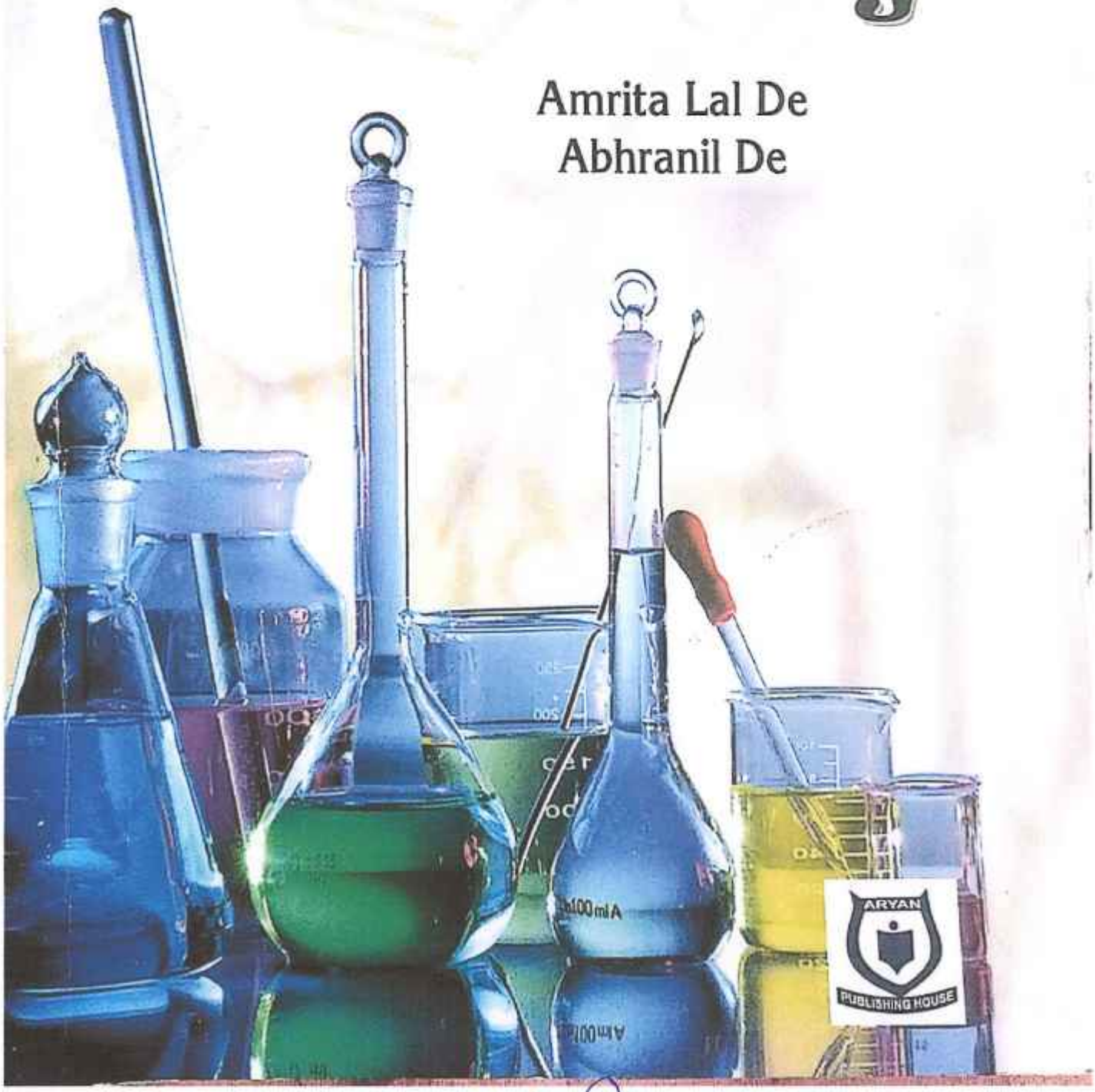
ENGINEERING Chemistry

Amrita Lal De
Abhranil De



Wind Effects on Cross Plan Shaped Tall Building

Rajdip Paul[a] and Sujit Kumar Dalui[b]

[a] Ph.D Student, Department of Civil Engineering, Indian Institute of Engineering Science and Technology, Shibpur, Howrah, India, email id: rajdippaul87@gmail.com

[b] Assistant Professor, Department of Civil Engineering, Indian Institute of Engineering Science and Technology, Shibpur, Howrah, India, email id: sujit_dalui@rediffmail.com

ABSTRACT

The wind effects on tall buildings are pretty complicated phenomena and needs a deep acuity as far as structural safety and serviceability are concern. The present paper is focused on the study of wind induced responses on a cross plan shaped tall building model to understand the effect of limbs over a tall building. A rectangular plan shaped tall building with two equal limbs on opposite sides is taken as the parametric model. Computational Fluid Dynamics (CFD) package of ANSYS CFX is used for analysis. The plan area of the building is 22500 mm^2 and the length scale is considered as 1:300. The external surface pressure coefficients at different faces for the model is carried out for wind occurrence angle 0^0 to 180^0 with interval of 30^0. Because of combination of pressure and suction in windward and leeward faces respectively, unsteady vortices are generated in the wake region. The flow separation characteristics and the wake regions where vortices are generated are evident from the wind flow pattern around the building. Furthermore, Force coefficient along X direction is found to have the maximum value for 180^0 wind angle and the same along Y direction is extreme at 90^0.

Keywords Tall building, CFD, Cross-shape, Wind angle, Force coefficient, Pressure coefficient.

1. INTRODUCTION

With advent of modern technology and scarcity of available land in the globe, modern buildings are very tall and at the same time non-conventional and irregular in both plan shape and elevation. Thus, tall buildings being very sensitive to lateral forces (Part-especially for response of across direction), may vibrate in all the three directions (x, y, z). As the building height increases, wind becomes the predominant lateral force as the wind intensity intensifies exponentially with the altitude of the building. Not only that, wind-induced responses depend significantly upon the shape of the building also. Hence, in this article, wind induced response is compared for a parametric model to understand the effect of horizontal limb on a rectangular building model. Different International Standards like IS: 875 (Part-3): 2015, AS-NZS: 1180:2011, ASCE-16 etc. are providing guidelines for estimating wind-induced responses for regular (both in plan and elevation) shaped buildings, but non-conventional, irregular shaped buildings demand guidance from special literature or wind tunnel study or CFD approach. Many researchers all over the globe are focused on predicting wind-induced responses for such typical tall buildings with various environmental conditions.

Irwin (2009) focused on determining and controlling the structural responses under dynamic wind phenomenon for super tall buildings which require much more rationally modelled wind engineering. Tominaga and Stathopoulos (2012) used Computational Fluid Dynamics technique to demonstrate turbulent scalar flux for near-field dispersion around buildings.

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Determination of Rating and Optimal Position of Distributed Generation

Chandan Jana
Dept. of Electrical Engineering
Hooghly Engineering and Technology College
Kolkata, India
jana_chandan@rediffmail.com

Mousumi Jana Bala
Dept. of Electrical Engineering
Meghnad Saha Institute of Technology
Kolkata, India
mousumibala@rediffmail.com

Md. Siraj
Dept. of Electrical Engineering
Hooghly Engineering and Technology College
Kolkata, India
mdsiraj14061998@gmail.com

***Abstract*—Here, in this work, firstly, the rating of a PV plant as a Distributed Generation has been determined based on the law of conservation of energy. Secondly, a method for optimal placement of the plant is proposed based on intelligent optimization technique namely particle swarm optimization (PSO). The searching of Equivalent Load Centre in the distribution system is considered to be the objective function for obtaining the optimal location of this DG. The proposed methods have been applied to IEEE 34 Nodes Feeder System.**

Keywords— Distributed Generation, particle swarm optimization, IEEE 34 Nodes Feeder System.

Nomenclature

i,j : Index of nodes
l : Line index
n : Number of lines
η : Efficiency of distribution system
$P_{i,sl}$: Spot load at i^{th} node
$P_{ij,dl}$: Distributed load in the line connected between i^{th} and j^{th} nodes
$P_{grid,k}$: Power delivered by grid during k^{th} interval
P_{Lk} : Line loss in l^{th} line during k^{th} interval

I. INTRODUCTION

Nowadays, integration of distributed generation (DG) in the distribution system becomes most important topic of interest among many researchers. Basic concept and its utility has been discussed in [1]. Environmental concerns, economical consideration, technological advancements and power system deregulation are reasons behind this DG penetration. The merits and demerits of using DG were discussed in paper [2]. Penetration of DG in distribution networks can lead to considerable reliability enhancement, loss reduction and improvement of voltage profile. In order to minimize line losses of power systems, it is important to determine the location and size generation in the system. The mathematical approaches on the optimum DG location are seen in different works. In [3], analytical approach has been given. [4] uses genetic algorithm and Hereford Ranch algorithm. Fuzzy-GA method were used in [5], tabu search technique has been applied in paper [6], Order algorithm method has been described in [7]. Authors in [8] developed an algorithm to determine the near optimal. The location of capacitor in different type of analysis, is obtained by 2/3 rule [9]. Even at present, the optimal location and sizing of generation has been continuously studied in order to achieve different objectives. Here, our whole work is summarized as follows:

Load Flow has been done on the existing Distribution System for three time zones—normal, peak and off-peak--with Grid connected at extreme up-stream. Voltages of all nodes and active and reactive losses are being noted. Thereafter, efficiency and power supplied by grid have been calculated. Size of the PV plant has been decided on the basis of law of conservation of energy. Optimization technique named PSO has been applied after the objective function, on the basis of finding Equivalent Load Center, is being formulated. It helps us determine the optimal position of DG to be installed. Again the Load Flow has been done on the same system with grid being disconnected and only DG being installed at optimal position obtained. Finally the results are being compared indicating improvements of some important quantities for the case when DG is there in the system.

In the section II, loads and distribution system have been modeled. In section III test system has been shown. Next two subsequent sections determine the rating of DG and its optimal position, respectively. In section VI results has been presented and in section VII conclusion has been drawn.

II. MODELING OF UNBALANCED DISTRIBUTION SYSTEM

The distribution system has been simulated using ETAP as shown. Initially, node number 1 is taken as slack bus where the grid is connected. Load flow using fast decouple method is done for mean values of active and reactive loads for three different time zones-- normal time zone, peak time zone and off peak time zone

A. Load modelling

If spot load at i^{th} node be $P_{i,sl}\ kW$ and distributed load throughout the line be $P_{ij,dl}\ kW/meter$ as shown in Fig.1. For the sake of simplicity, total distributed load is first made half and then added with the spot load.

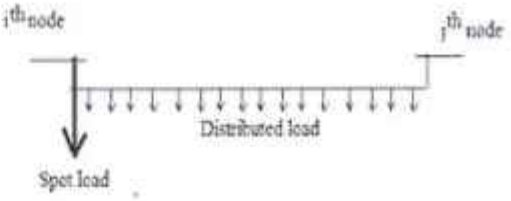

Fig. 1 Distribution of load

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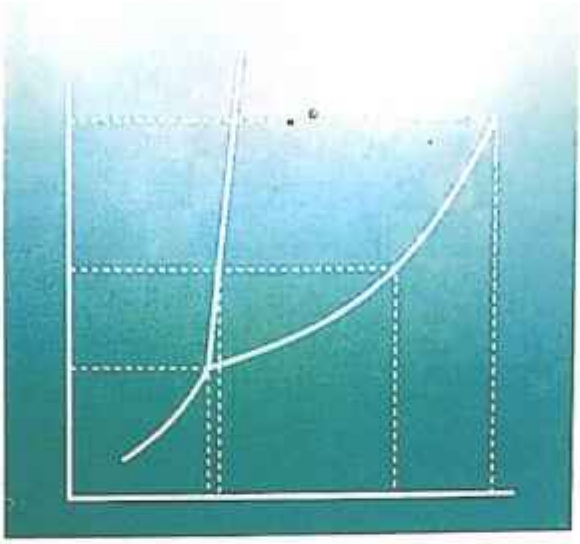

PHYSICAL CHEMISTRY

[THEORY, PROBLEMS & SOLUTIONS]

Amrita Lal De
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VOLUME 1

Chapter 22
A Shaft Finite Element for Analysis of Viscoelastic Tapered and Hollow Tapered Rotors

Amit Bhowmick, Arghya Nandi, Sumanta Neogy and Smitadhi Ganguly

22.1 Introduction

A load deformation characteristic of solid material is explained by Hooke's law for linear elastic material, where energy is stored when load is applied and released on unloading without any energy dissipation. In presence of relative velocity in-between fluid layers energy dissipates, where dissipated energy is directly proportional to the rate of shear strain and shear stress is quantified by Newton's law of viscosity. In reality, solid materials not only store energy but also dissipate energy on application of external load. In free vibration analysis of a damped flexible rotor, several models explaining both storing and dissipation of energy are used to incorporate this energy dissipation, like two-, three- or four-element spring damper model, Maxwell model, Maxwell–Wiechert model and Kelvin–Voigt model.

In the literature of vibration analysis of rotor-bearing system, several works have been done using finite element approach. Finite element model for rotor-bearing system considering Euler–Bernoulli beam theory for taper and cylindrical shaft is analysed by Nelson [1, 2]. Similarly, a comparative study on dynamic analysis of rotor is done [4] in between Timoshenko and Euler–Bernoulli theory for different slenderness ratio of rotor. These analyses are performed considering the shaft material as elastic. In free vibration analysis, gyroscopic force makes natural frequency to be dependent of spin speed and real part remains zero, but if damping is present in material, then the real part becomes nonzero, and after certain spin speed, this value becomes positive which makes system unstable. Hence, the study of rotor

A. Bhowmick (✉) · A. Nandi · S. Neogy
Department of Mechanical Engineering, Jadavpur University, Kolkata 700032, India
e-mail: amitbhowmick555@gmail.com

S. Ganguly
Department of Mechanical Engineering, Hooghly Engineering and Technology College, Hooghly 712103, India

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PHYSICAL CHEMISTRY

[THEORY, PROBLEMS & SOLUTIONS]

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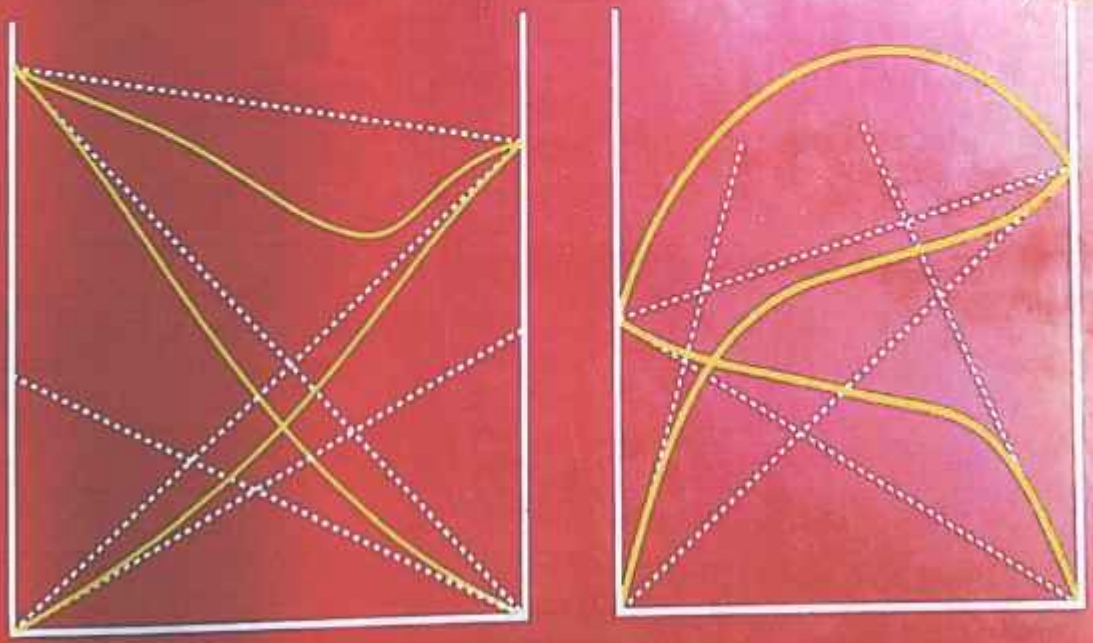

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Qualitative Analysis of Contamination Severity between NaCl and $CuSO_4$ for Outdoor Insulator

Sanmoy Chakraborty, Sanjoy Podder, Suhas Deb
Department of Electrical Engineering
Jadavpur University, India

Sudeshna Nath
Department of Electrical Engineering
BBIT College, India

Abstract—**This paper presents a new criterion for insulator flashover condition prediction based on percentage 5th to 3rd harmonic component. These harmonics are extracted from leakage current of insulator employing FFT. In this context, a threshold limit of this ratio has been mentioned. To investigate experimentally, leakage current of an 11 kV glass disc insulator (contaminated at three different levels) has been recorded at different applied voltages. For contamination purpose two different types of salt are taken as contaminants, one is NaCl and other is $CuSO_4$. Above mentioned ratio has been calculated for both types of contamination separately and compared. Results show that contamination due to NaCl is more severe than that of $CuSO_4$.**

Keywords— *Leakage current, insulators, ESDD, FFT, humidity, NaCl, $CuSO_4$*

I. Introduction

Insulator is one of the key components of modern day power system. About 70% of line outages occur due to contamination flashover of insulator [1]. Most of the transmission line insulators remain exposed to various atmospheric states at distinct geographic areas. So, insulators get contaminated easily. Paper [2] reports that, contaminants at dry condition do not create any surface activity. Contaminants in presence of moisture form a conducting layer over the surface of insulator. Hence, leakage current starts to flow. Density of leakage current is non-uniform due to unequal wetting of insulator surface. In this regard, huge current density comes in sight at some portion of insulator which subsequently gives rise to localized heating. This heating effect leads towards partial evaporation of moisture to those places. As a result dry band region appears on the insulator surface. Formation of dry band interrupts the flow of leakage current. It is reported in [2] that, voltage stress across this dry band grows up to a very huge value which is enough to cause breakdown in the form of arc. These arcing phenomena may leads towards a complete flashover [3-10], unless get checked in proper time. Therefore, condition monitoring of insulator is very much essential for uninterrupted power supply.

Existing literatures reveal that, estimation of equivalent salt deposit density (ESDD), non-soluble deposit density (NSDD), are the most commonly applied techniques to ascertain the pollution severity for any kind of insulators [3-5]. However, these methods are time consuming and difficult to automate [6]. Considering the limitation of above mentioned method, researchers have focused on analyzing the leakage current for diagnosis of insulator surface condition. In this context, analysis of lower order harmonic contents is very much helpful to extract needful information about the surface condition of insulator [7-8]. It is mentioned in [7] that, percentage ratio of 5th to 3rd harmonic component is a very important indicating parameter for the contamination level of insulator. Threshold limit of this ratio of is also been mentioned in [7].

This proposed technique is a suitable way out towards predicting the probable flashover condition. In this regard, an 11 kV glass disc insulator has been tested with two different salts as contaminants (NaCl and $CuSO_4$) at three different contamination levels. For each contamination level, percentage 5th to 3rd harmonic component ratio has been calculated and compared between two types of pollutants. From the result, authors have tried to predict whether NaCl contamination is more severe than that of $CuSO_4$ contamination or vice-versa. The proposed technique has been checked several times to investigate its effectiveness. All the necessary experiments carried out here follow IEC 60507 standard.

II. Setup

A 11kV glass disc insulator has been utilized for laboratory test purpose. Various characteristics of glass insulator are presented in table 1. A test set up has been organized in laboratory according to IEC 60507 standards[4]. Diagram of test set up is given in fig 2. Testing transformer of rating 150 kVA, 500kV/250 V, single phase 50 Hz is used for applying voltage to the conductor [2]. Transformer output voltage is fed to the insulator via a series connected protective resistance of rating 180 kΩ. Earth link of the above mentioned insulator is connected by a 10 kΩ resistor which works as a current shunt, connected parallel to the measuring device [2]. Potential drop across current shunt has been calculated from measuring device, and the leakage current passing by the shunt is measured from there [2]. Protection due to overvoltage condition is required to avert any harm that may happen in measuring instruments owing to any collapse in the system [2]. Had resistance for protection been attached to secondary of the transformer gets harmed owing to any accidental case at the time of flashover, the potential drop across 10 kΩ resistor will build up to a very huge magnitude [2]. At this condition protection for voltage surge starts to operate and guards both data recording instruments and CRO [2].

suhas Deb

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WIND EFFECTS ON 'L' PLAN SHAPED TALL BUILDING: A CASE STUDY

Rajdip Paul [1]* and Sujit Kumar Dalui [2]

[1]Ph.D Student, Department of Civil Engineering, Indian Institute of Engineering Science and Technology, Shibpur, Howrah, India, email id: rajdippaul87@gmail.com
[2]Assistant Professor, Department of Civil Engineering, Indian Institute of Engineering Science and Technology, Shibpur, Howrah, India, email id: sujit_dalui@rediffmail.com, ph: +919051135399
** Corresponding Author*

ABSTRACT

The present paper is focused on the study to understand effects of position of limb on the behavior of various surfaces of an 'L' plan shaped tall building under varying wind direction. Here a model with slightly different position of the limb has been considered and analyzed by numerical simulation to comprehend effects of position of limb on rectangular building models. The analysis has been carried out using CFD (Computational Fluid Dynamics) package of ANSYS. The length scale is taken as 1:300. Force coefficients both in along and across wind direction as well as the external surface pressure coefficients for different faces of the object building are determined and listed for wind incidence angle 0° to 330° with increment of 30°. The wind flow pattern around the building showing flow separation characteristics and vortices are presented. The nature of deviation of external pressure coefficients along height of the building for different wind angle of attack are presented. Unsteady vortices are generated in the wake region due to combination of positive and negative pressure in windward and leeward faces respectively.

Key Words: *Tall building, CFD, Wind effect, Wind angle, Force coefficient, Pressure coefficient.*

INTRODUCTION

As building structures are cantilever structures, there is generation of base moment whenever it is under lateral load. The magnitude of the moment increases considerably with slenderness because the moment is proportional to the square of the height of building just like a cantilever beam under varying load. Because of the scarcity of land these days, vertical construction is given due importance and the buildings are going much higher than before making them highly susceptible under horizontal loading like wind load. In addition to this, if the plan of the building is unconventional then wind analysis is a task of great complexity because of the many flow situations arising from the interaction of wind with structures. There are several different phenomena giving rise to dynamic response of tall structures under wind like buffeting, vortex shedding, galloping and flutter. Simple quasi-static analysis of wind loading, which is globally applied to design of low to medium-rise structures, can be unacceptably conservative for design of very tall buildings. At present, wind tunnel model experiment and numerical simulation using computational fluid dynamics (CFD) are the available research tools to get deeper insight to the behavior of gigantic structures subjected to turbulent wind load.

Third National Conference on Recent Advances in Traffic Engineering
SVNIT, Surat, Gujarat, 11-12 August, 2018.

Capacity Estimation of Indian Multilane Highway By Calibrating Driver's Behavior Parameters

Tanumoy Ghosh[1], Sudip Kumar Roy[2, *], Subhamay Gangopadhyay[3]

ABSTRACT

The heterogeneous traffic conditions with non-lane based traffic flow can be best evaluated by simulation of traffic. The present study uses VISSIM to simulate the mixed traffic of Indian multilane highways as it is a time increment based multi-modal simulation software. The psycho-physical behavior of drivers is considered in the present study because the driver performs an action when a threshold is reached to its boundary, and is expressed as the function of speed differences and distances between the vehicles. The calibration by several dimensions is done on car following model that has been modified by Wiedemann in VISSIM. The driver of a vehicle in VISSIM considers the leading vehicles and vehicles on adjoining lanes. Thus Hysteresis plots of relative speed against relative distance are made for aggregated leader and follower vehicles based on follower vehicular category to get the calibrated coefficient of correlation parameters (CC) used in VISSIM. A new simulation model with calibrated CC parameters is made to get a more realistic capacity estimate of multilane highway in Indian conditions.
Keywords: Heterogeneous, Simulation, VISSIM, Hysteresis, Capacity.

1. INTRODUCTION

The road network is considered to be very much crucial in the socio-economic expansion of any nation, particularly for developing nation like India. India along with many other developing countries is extensively involved in expanding their road network for building a better transportation and logistics system. India has one of the prevalent road set-up in the world [1], spread across in diverse conditions of roadway, traffic and weather. The rate of traffic flow growth is considered six to eight percent per annum and it is further expected to increase in near future, while the increase in road length is less than two percent resulting in rigorous obstruction taking place in every essential highway within the nation. The traffic flow demand is growing rapidly and soon it would be in the form of overcrowding of motorized and non-motorized vehicles on roadway networks. Significant increase in vehicular traffic volume on these roads is alarming to adopt special measures and to set priorities for improving current status of roadway system. India has been involved in the roadway capacity amplification through planning and implementing new multilane highway projects for providing better accessibility, safety and service to the native people.

[1] Research Scholar, Indian Institute of Engineering Science and Technology, Howrah, 711103, India
1 Email id: ghoshtanumoy76@gmail.com
[2] Professor and former Head, Civil Engineering Department, Dean (Planning & Development) & Director, School of Ecology, Infrastructure and Human Settlement Management, Indian Institute of Engineering Science and Technology, Howrah, 711103, India
2 Email id: royksudip@gmail.com
[3] Former Director, CSIR-CRRI, New Delhi, 110025, India
3 Email id: subhamay16@gmail.com
* Corresponding Author: royksudip@gmail.com, Telephone: 91-33-26684561-63 [Extn 666], Fax: 91-33-26682916.

Comparison Study on the basis of transient response between Voltage Mode Control (VMC) & Current Mode Control (CMC) of Buck Converter

Pranik Roy
Department Of Electrical Engineering
Hooghly Engineering & Technology College
West Bengal, India
im.pranikroy@gmail.com

Koushik Banerjee
Department Of Electrical Engineering
Hooghly Engineering & Technology College
West Bengal, India
kou.2007@rediffmail.com

Shilpi Saha
Department Of Electrical Engineering
Hooghly Engineering & Technology College
West Bengal, India
shilpi.2008@gmail.com

Abstract- This paper presents mainly the two control topologies of Dc-Dc Buck Converter, particularly, the Current Mode Control (CMC) and the Voltage Mode Control (VMC) with the prime objective to study their operations and also to show their transient response under line and load disturbances. Thus the simulation studies performed on buck converter and the result analysis will shows that current mode control require smaller time to attain steady state than voltage mode control and hence current mode control provides faster transient response than voltage mode control.

Keywords—Buck Converter, CMC, VMC, Transient analysis

I. Introduction

Switched mode DC-DC converters are considered as some of the simplest power electronic circuits which are used to convert one level of electrical voltage into another level by means of switching action. As a result, these converters have received an increasing deal of interest in many areas. This is due to their wide range of applications like power supplies for personal computers, office equipment, appliance control, telecommunication equipment, DC motor drives, automotive, aircraft, etc. Dc-Dc switching converters have also been used as power supplies for many portable electronic devices and microprocessors because of their high conversion efficiency. Fast load changes presented by high-speed microprocessors have drastically increased the importance of transient response of DC-DC power supplies[1].There are several control strategies that are developed for the control of Dc-Dc converter. To obtain a control a control method that will perform effectively under any condition is always in demand. In this paper only the two control topologies i.e. the current mode control and the voltage mode control are considered.

There are several factors which have to be considered in order to determine the effectiveness of these two control topologies. This paper is organized in such a way in order to give the proper explanations of the operating principle, design parameters, detailed simulated results of the transient analysis of the two control topologies in a comparative manner. Analysis and simulation will also prove the faster transient response among the two control topologies i.e. the Current mode control and the Voltage mode control.

II. Operating Principle of Voltage Mode Control (VMC)

For the operation of voltage mode control of dc-dc buck converter, at first the output voltage is measured and it is compared to a reference voltage. The VMC method then uses the measured output voltage and the reference voltage to generate the control voltage. The reason behind the generation of control voltage is that the control voltage is used to determine the switching duty ratio by comparision with a constant frequency waveform. This duty ratio is used to maintain the average voltage across the inductor. As a result, this will eventually bring the output voltage to its reference value. Thus it will help in maintaining the constant voltage without any variation [4]. In this method a control signal Vcon is generated and compared with Vramp and switching signal is sent on the basis of the following conditions [3]

If Vramp < Vcon ; switch(S) is on

If Vramp > Vcon ; switch(S) is off

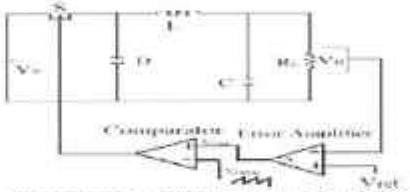

Fig.1 Schematic diagram of dc-dc buck converter connected with the Voltage mode controller

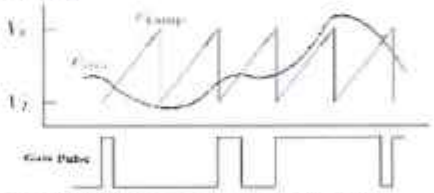

Fig.2 Schematic of PWM control signal for Voltage mode controller

Analyzing Social Trend Towards Girl Child in India: A Machine Intelligence-Based Approach

Sirshendu Hore and Tanmay Bhattacharya

Abstract In India, feticide or sex-selective abortion is the main reason for the sharp drop in the Child Sex Ratio (CSR). To remove this type of sick mindset from the society and to empower women by proper education, the Government of India has launched a social consciousness program under the banner "Beti Bachao Beti Padhao (BBBP)" when translated stand as "save girl child, educate her", in the year 2015. It has been observed that, nowadays, researchers are using the power of Natural Language Processing (NLP) to analyze the opinion or suggestions posted on social media. In the proposed work, the opinion expressed by various people on Twitter for a certain period of time has been taken up for analysis. Machine intelligence has been used to classify the opinion. In the current work, instead of binary classification, a multi-class sentiment classification has been introduced. To achieve the objective of the proposed work, four popular classifiers of machine intelligence domain have been used. Accuracy and Kappa statistics has been employed to measure the performance of the proposed model.

Keywords Natural language processing · Sentiment analysis
Sentiment polarity categorization · Social media · Twitter

1 Introduction

In Asia, the female sex ratio is declining on a frightening level and India is at the top of this decreasing ratio. The 2011 census of India suggests that, the sex ratio of children aged between 0 and 6 were 945 girls per 1000 boys in 1961. Now the ratio has dropped from 945 to 918 girls per 1000 boys. Although we are living in

S. Hore (✉)
Department of CSE, HETC, Hooghly, India
e-mail: shirshendu.hore@hetc.ac.in

T. Bhattacharya
Department of IT, TISL, Kolkata, India
e-mail: drtb@gmail.com

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