

STARTING CURRENT ANALYSIS AND CONTROL IN THREE PHASE INDUCTION MOTOR USING FUZZY LOGIC CONTROLLER

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ABSTRACT

Variable speed drives are growing and varying. Drives expanse depend on progress in different part of science like power system, microelectronic, control methods, and so on. With the use of space vector technique to electrical drive control the, efficiency and reliability of drives increase and volume, weight and cost of them decrease. Due to the improved operating characteristics they give to the equipment control, Escalators pumps, elevators and conveyor belts all operate more effectively if they are soft started. In turn, the SVPWM method and FLC method reduces maintenance, conserves energy and plays a significant part in improving plant performance and operating costs. This paper presents a novel design of a Sugeno fuzzy logic control scheme for controlling some of the parameters, such as starting current, speed, torque, flux, voltage, etc. of the induction motor. Induction motors are characterized by highly non-linear, complex and time-varying dynamics and inaccessibility of some of the states and outputs for measurements, and hence it can be considered as a challenging engineering problem. The development of advanced control techniques has partially solved induction motor's speed control problems; because they are sensitive to drive parameter variations and the performance may deteriorate if conventional controllers are used. Fuzzy logic based controllers are considered as potential candidates for such an application. Further, the Sugeno control strategy coupled with rule based approach in a fuzzy system when employed to the induction motor yields excellent results compared to the other methods as this becomes a hybrid & integrated method of approach. Such a mixed implementation leads to a more effective control design with improved system performance, cost-effectiveness, efficiency, dynamism, & reliability. Its performance is thereby evaluated for the speed control. The simulation results presented in this paper show the effectiveness of the method developed & have got a wide number of advantages in the industrial sector & can be converted into a real time application using some interfacing cards.

Keywords- *PI Controller Fuzzy Logic Controller, Simulink Matlab, Induction Motor, IGBT Inverter, Vector Control Technique, Closed Loop, Parameter, Robustness.*

I. INTRODUCTION

An important factor in industrial progress during the past five decades has been the increasing sophistication of factory automation which has improved productivity manifold. Manufacturing lines typically involve a variety of variable speed motor drives which serve to power conveyor belts, black start power plants, robot arms, overhead cranes, steel process lines, paper mills, and plastic and fibre processing lines to name only a few. Prior to the 1950s all such applications required the use of a DC motor drive since AC motors were not capable of

smoothly varying speed since they inherently operated synchronously or nearly synchronously with the frequency of electrical input. To a large extent, these applications are now serviced by what can be called general-purpose AC drives. In general, such AC drives often feature a cost advantage over their DC counterparts and, in addition, offer lower maintenance, smaller motor size, and improved reliability. However, the control flexibility available with these drives is limited and their application is, in the main, restricted to fan, pump, and compressor types of applications where the speed need be regulated only roughly and where transient response and low-speed performance are not critical. More demanding drives used in machine tools, spindles, high-speed elevators, dynamo meters, mine winders rolling mills, glass float lines, and the like have much more sophisticated requirements and must afford the flexibility to allow for regulation of a number of variables, such as speed, position, acceleration, and torque. Such high-performance applications typically require a high speed holding accuracy and fast transient response. Until recently, such drives were almost exclusively the domain of DC motors combined with various configurations of AC-to-DC converters depending upon the application. With suitable control, however, induction motors have been shown to be more than a match for DC drives in high-performance applications. While control of the induction machine is considerably more complicated than its DC motor counterpart, with continual advancement of microelectronics, these control complexities have essentially been overcome. Such that power electronic equipment used widely in motor drives is IGBTs. In the last few decades, the induction motor has evolved from being the constant speed motor to a variable speed, variable torque machine. When application require large amount of power and torque, the induction motor become more efficient to use. With the use of variable voltage, variable frequency (VVVF), the use of induction motor has increased. Variable frequency IGBT inverter fed space vector control method is widely used to control the speed harmonic, and starting current, voltage, rotor speed, output torque of a 3 phase squirrel cage induction motor (IM) over a wide range by varying the stator frequency. In particular the IGBT fed space vector control are widely preferred in industries for individual medium to high power variable speed drive system, driving a group of motors connected in parallel at economic cost. The “Insulated Gate Bipolar Transistors (IGBT) is a common choice in modern VFD. The IGBT can switch on and off several thousand times per second and precisely control the power delivered to the motor as shown in figure1. The IGBT uses “pulse width modulation” (PWM) technique to simulate a sine wave current at the desired frequency to the motor is shown in figure 2. In the last few years, fuzzy logic has met a growing interest in many motor control applications due to its non-linearity’s handling features and independence of the plant modelling.

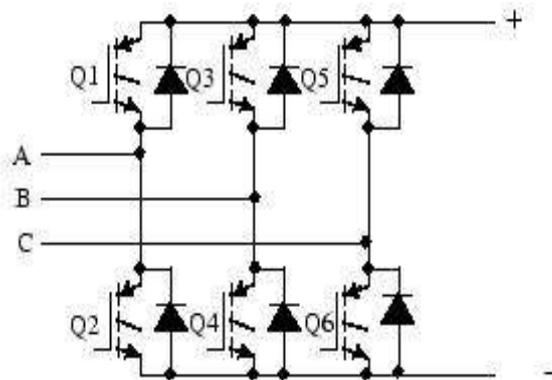


Figure1. IGBT Power Electronic Element

II. METHODOLOGY OF WORK

A simulation model of such induction motor drive system is developed and its dynamic response is verified by observing starting current voltage and torque and control to established acceptability of the model. Here we used transistors based drives. The transistor based drives are capable of both turn on and turn off. In this paper to control the starting current we use two types of controllers. The fuzzy logic controller (FLC) operates in a knowledge-based way, and its knowledge relies on a set of linguistic if-then rules, like a human operator. This paper presented a rule-based fuzzy logic controller applied to a scalar closed loop induction motor control with slip regulation & they also compared their results with those of a PI controller. They used a new linguistic rule table in FLC to adjust the motor speed, and starting current. In this context, the fuzzy logic concepts play a very important role in developing the controllers for the plant as this controller does not require that much complicated hardware & uses only some set of rules. The principal motivations for such a hybrid implementation is that with fuzzy logic, neural networks & rough sets issues, such as uncertainty or unknown variations in plant parameters and structure can be dealt with more effectively, hence improving the robustness of the control system. Conventional controls have on their side well-established theoretical backgrounds on stability and allow different design objectives such as steady state and transient characteristics of the closed loop system to be specified.

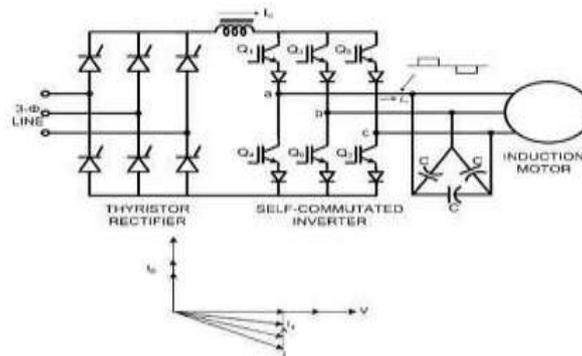


Fig2- Transistor Control of Induction Motor

There are a number of significant control methods available for induction motors including scalar control, vector or field-oriented control, direct torque and flux control, sliding mode control, and the adaptive control. Since, the induction motor is a complex nonlinear system; the time-varying parameters entail an additional difficulty during the controller design. In this paper we used indirect vector control method. Vector control methods have been proposed by various researchers to simplify the speed control of induction motors so they can be controlled like a separately excited dc machine. Indirect vector control methods decouple the motor current components by estimating the slip speed, which requires a proper knowledge of the rotor time constant. Classical control systems like PI, PID control have been used, together with vector control methods, for the speed control of induction machines. The main drawbacks of the linear control approaches were the sensitivity in performance to the system parameters variations and inadequate rejection of external perturbations and load changes.

As an attempt to solve all these deficiencies, problems & difficulties encountered in designing the controller as mentioned in the above paragraphs, we have tried to devise a control strategy using the Sugeno fuzzy scheme for the speed control of IM in our paper which has yielded excellent results & this has been applied to the

control of electrical drive systems (induction motor). The results of our work have showed a very low transient response and a non-oscillating steady state response with excellent stabilization.

III. CONTROL SCHEME (VECTOR CONTROL PRINCIPLE)

AC motors, particularly the squirrel cage induction motor (SCIM), enjoy several inherent advantages like simplicity, reliability, low cost and virtually maintenance free electrical drives. However, for high dynamic performance industrial application, their control remains the challenging problem, because they exhibit significant non-linearity and many of the parameters, mainly the rotor resistance, vary with the operating condition. Field orientation control (FOC) or vector control of an induction motor achieves decoupled torque and flux dynamics leading to independent control of the torque and flux as for a separately excited DC motor. FOC methods are attractive but suffer from one major disadvantage: they are sensitive to motor parameter variations such as the rotor time constant and an incorrect flux measurement or estimation at low speeds consequently, performance deteriorates and a conventional controller such as a PI is unable to maintain satisfactory performance under these conditions. Large majority of variable speed Applications require only speed control in which the torque response is only of secondary interest, more challenging applications such as traction applications, servomotors and the like depend critically upon the ability of the drive to provide a prescribed torque whereupon the speed becomes the variable of secondary interest. The method of torque control in ac machines is called either vector control or, alternatively field orientation.

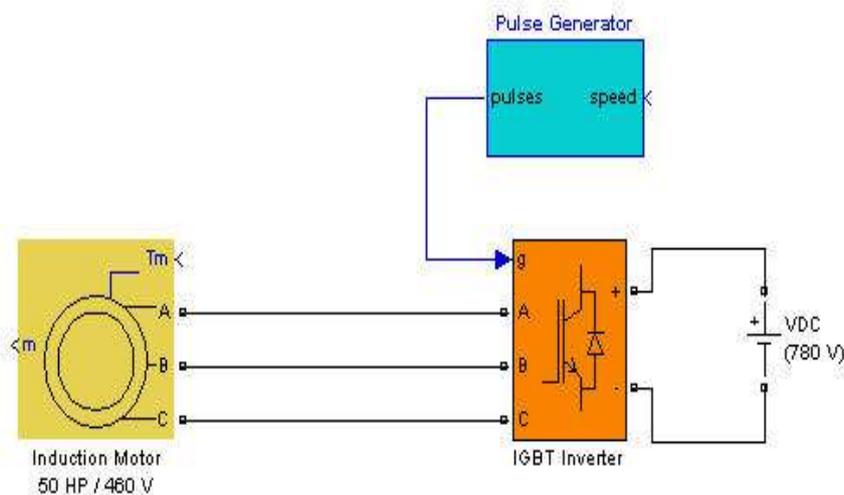


Figure3. A Transistor Based Induction Motor Drive

Vector control refers to the manipulation of terminal currents, flux linkages and voltages to affect the motor torque while field orientation refers to the manipulation of the field quantities within the motor itself. Since it is common for machine designers to visualize motor torque production in terms of the air gap flux densities and MMFs instead of currents and fluxes which relate to terminal quantities, it is useful to begin first with a discussion of the relationship between the two viewpoints. The feedback speed control loop generates the active or torque current command i_{qs}^* . The vector rotator receives the torque and excitation current commands i_{qs}^* and i_{ds}^* from one of the two positions of a switch: the transient position (1) or the steady state position (2). In this paper both control methods (Classical PI controller and Fuzzy Control base) are introduced and applied to

A controller is a device which controls each & every operation in the system making decisions. From the control system point of view, it is bringing stability to the system when there is a disturbance, thus safeguarding the equipment from further damages. It may be hardware based controller or a software based controller or a combination of both. In this section, the development of the control strategy for control of various parameters of the induction machine such as the speed, flux, torque, voltage, stator current is presented using the concepts of Sugeno based fuzzy control scheme. A fuzzy set A of a universe of discourse X is represented by a collection of ordered pairs of generic element $x \in X$ and its membership function $\mu : X \rightarrow [0, 1]$, which associates a number $\mu_A(x) : X \rightarrow [0, 1]$, to each element x of X . A fuzzy logic controller is based on a set of control rules called as the fuzzy rules among the linguistic variables as shown in the figure 7. These rules are expressed in the form of conditional statements. Our basic structure of the fuzzy logic coordination controller to damp out the oscillations in the power system consists of 3 important parts, viz., fuzzification, knowledge base – decision making logic (inference system) and the defuzzification. The necessary inputs to the decision-making unit blocks are the rule-based units and the data based block units. The fuzzification unit converts the crisp data into linguistic variables. The decision making unit decides in the linguistic variables with the help of logical linguistic rules supplied by the rule base unit and the relevant data supplied by the data base. The output of the decision-making unit is given as input to the de-fuzzification unit and the linguistic variables are converted back into the numeric form of data in the crisp form.

The decision-making unit uses the conditional rules of ‘IF-THEN-ELSE’, which can be observed from the algorithm mentioned in the algo for developing the fuzzy rules below. In the fuzzification process, i.e., in the first stage, the crisp variables, the speed error & the change in error are converted into fuzzy variables or the linguistic variables. The fuzzification maps the 2 input variables to linguistic labels of the fuzzy sets. The fuzzy coordinated controller uses the linguistic labels. Each fuzzy label has an associated membership function. The inputs are fuzzified using the fuzzy sets & are given as input to fuzzy controller. The rule base for the decision-making unit is written as shown in the table I. The developed Takagi-Sugeno fuzzy rules ($7 \times 7 = 49$) included in the fuzzy coordinated controller.

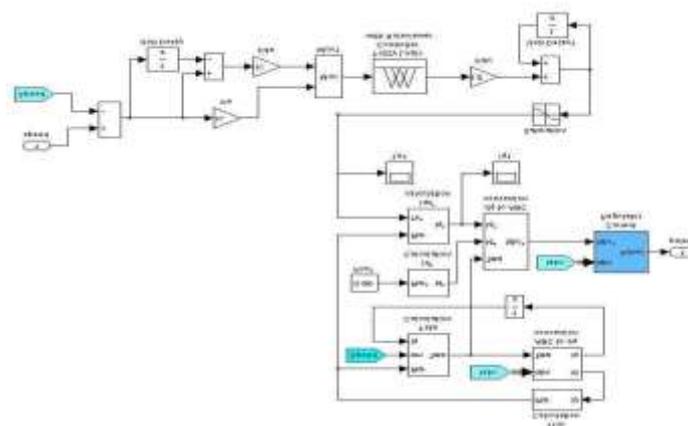


Figure5. Fuzzy Logic Controller with Indirect Vector Control Scheme

VI. TABLE FOR FUZZY RULE BASE

NB=negative big, NM=negative medium, NS=negative small, ZE=zero, PS=positive small, and PM=positive medium, PB=positive big). The rule base table can be read according to the following example:

VIII. SIMULATION RESULTS & DISCUSSIONS

In this paper two case studies have been studied. In Both simulations, it is used simulink and Power sym toolboxes of MATLAB software. In the first case study, a 50 HP induction motor is started and controlled by a PI controller as shown in the figure 4. 3phase voltages and currents are measured and plotted in the first 3 seconds of its action. Also acceleration curve and output torque are investigated. In the second case, the same motor is started and controlled by a Fuzzy Logic Based controller as it is shown in figure 5. The outputs are improved regarding to magnitude of starting currents and also time response of acceleration.

For example amplitude of current with a classic PI controller is about 500 A during start-up as shown in the fig. 8

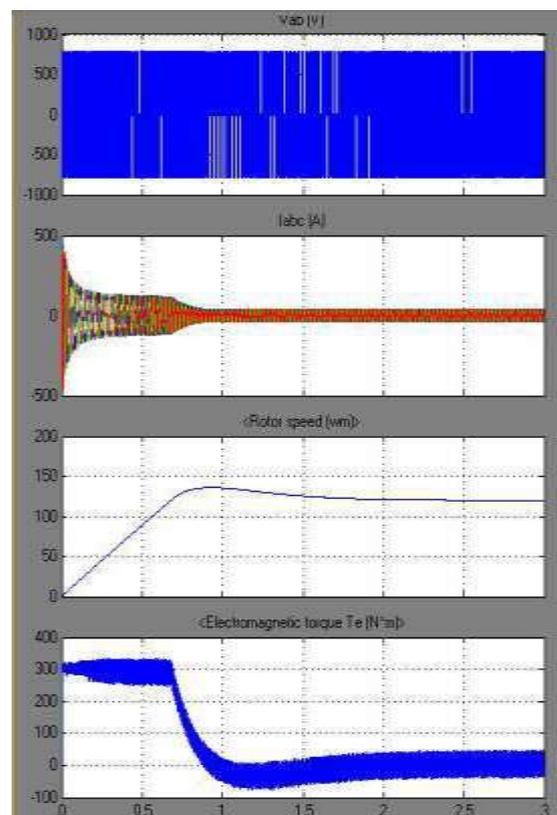


Figure8. Output Variable Of A Classic Controlled Induction Motor From Top To Bottom: Voltage, Current, Rotor Speed And Output Torque.

Time Cycle (in seconds)	Vab(V)	Iab(A)	Rotor speed(rpm)	Torque(Nm)
0	800	500	0	0
0.5	0	200	90	350
1	0	100	140	350
1.5	800	100	130	350
2.0	800	100	120	350
2.5	0	100	120	300
3	800	100	120	300

while with fuzzy logic controller this value reduced to 200 A as shown in the fig. 9.

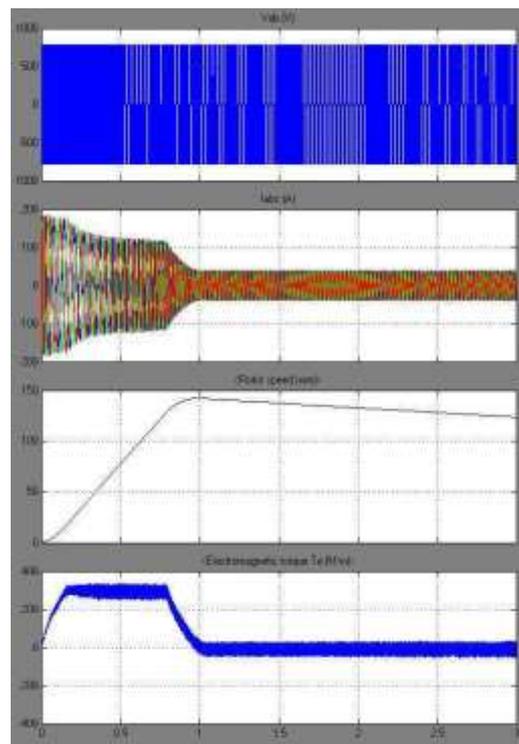


Figure9. Output Variable Of A Fuzzy Logic Controlled Induction Motor From Top To Bottom: Voltage, Current, Rotor Speed, And Output Torque.

Observation Table-2

Time Cycle (in seconds)	Vab(V)	Iab(A)	Rotor speed(rpm)	Torque(Nm)
0	800	200	0	0
0.5	800	130	70	300
1	0	70	145	300
1.5	800	70	140	250
2.0	0	70	135	250
2.5	800	70	133	230
3	800	70	130	230

Simulink model with the controller for the speed control of IM is developed in Matlab as shown in the figure. Note that the fuzzy coordinated TS controller consists of 3 basic blocks viz., fuzzification, inference, and the de-fuzzification blocks as shown in the Figure. A set of 49 fuzzy rules are written and called in the form of a file in the developed Simulink model with the controller. While the simulation is run, the 2 fuzzy inputs are then given to the controller (Sugeno-fuzzy), where the output is obtained thereafter. The response curves of flux, load, torque, terminal voltage, and speed & stator currents v/s time are observed on the respective scopes & are shown in the Figure respectively after importing the scope data into the workspace and plotting them. From the simulation results shown in the Figure, it is observed that the stator current does not exhibit any overshoots, undershoots, the response of the flux, torque, terminal voltage, speed & stator currents, etc. takes lesser time to settle & reach the desired value. This shows the effectiveness of the developed controller. It is also observed that

with the controller, the response characteristics curves take less time to settle & reach the final steady state value compared to that PI controller.

IX. CONCLUSION

In this paper two case studies have been studied. In Both simulations, it is used simulink and powersym toolboxes of MATLAB software. An AC induction motor can consume more energy than it actually needs to perform its work, particularly when operated at less than full load conditions. This excess energy is given off by the motor in the form of heat. Idling, cyclic, lightly loaded or oversized motors consume more power than required even when they are not working.

A systematic approach of achieving robust speed control of an induction motor drive by means of Sugeno based fuzzy control strategy has been investigated in this paper. Simulink models were developed in Matlab 7 with the Sugeno based fuzzy controllers (hybrid controller) for the starting current control of IM. The control strategy was also developed by writing a set of 49 fuzzy rules according to the Sugeno control strategy. The main advantage of designing the Sugeno based fuzzy coordination scheme to control the starting current of the IM is to increase the dynamic performance & provide good stabilization. Simulations were run in Matlab 7 & the results were observed on the corresponding scopes. Graphs of speed, torque, starting current, voltage, etc. vs. time were observed. The output takes less time to stabilize, which can be observed from the simulation results. The developed control strategy is not only simple, reliable, and may be easy to implement in real time applications, but also cost-effective as when this control scheme is implemented in real time, the size of the controller will become very small. Collectively, these results show that the Sugeno fuzzy controller provides faster settling times, has very good dynamic response & good stabilization. With a fuzzy logic controller we can control the amplitude of starting current and also save more energy during this time.

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JAVA WEB DESIGN FRAMEWORKS: REVIEW OF JAVA FRAMEWORKS FOR WEB APPLICATIONS

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ABSTRACT

In this paper I have present Web design frameworks as a conceptual methodology to exhaust the possibilities reuse in Web applications. Firstly talk over the necessity for construction abstract and reusable directional design structures, demonstrating with different kinds of Web Information Systems. Hibernate Framework technology as a unique and well-organized resources to access massive databases and also emphases on how to implement persistent features in object-oriented system finished it. It provides an indication of design patterns and frameworks and discovers the association between design patterns and frameworks. Java accepts N-tier framework of MVC Model in J2EE platform and uses EJB, Struts Web Framework and Hibernate technology.

Keywords: *Framework, Hibernate, J2EE, spring, Web Design*

I. INTRODUCTION

A study of the Java language expending the framework of abstract understanding has been the subject of substantial research in the last decade. Structure compound Web applications such as ecommerce applications is a time consuming task [1]. A major segment of the improvement of an enterprise application involves the creation and conservation of the persistence layer used to gather and retrieve objects from the database of choice. Hibernate phases in to fill this crack, provided that an easy-to-use and authoritative object relational persistence Framework for Java applications [2]. And Design patterns assistance to identify, name and abstract frequent problems in software development and to identify best practice solutions. Tools and techniques for testing concurrent Java programs are still under active research and include static analysis, dynamic analysis, model checking, and combinations of these techniques [3]. The objective of this paper refer to a practical library and practise to model check Java programs for confirming simultaneous components without the essential to install other more complex tackles, and show how this procedure can be functional in manufacturing and saleable settings today [4].The Spring Framework provides a comprehensive programming and configuration model for modern Java-based enterprise applications - on any kind of deployment platform. A key element of spring is infrastructural support at the application level: Spring focuses on the "plumbing" of enterprise applications so that teams can focus on application-level business logic, without unnecessary ties to specific deployment environments [5].

II. SPRING FRAMEWORK ARCHITECTURE

The spring framework offers one-stop works for java based application on all layers (one tier- stand-alone java application, web tier- in web application and enterprise tier tier- Enterprise Java Beans).The Spring Framework arrange for about 20 modules which can be used based on an application requirement [6].

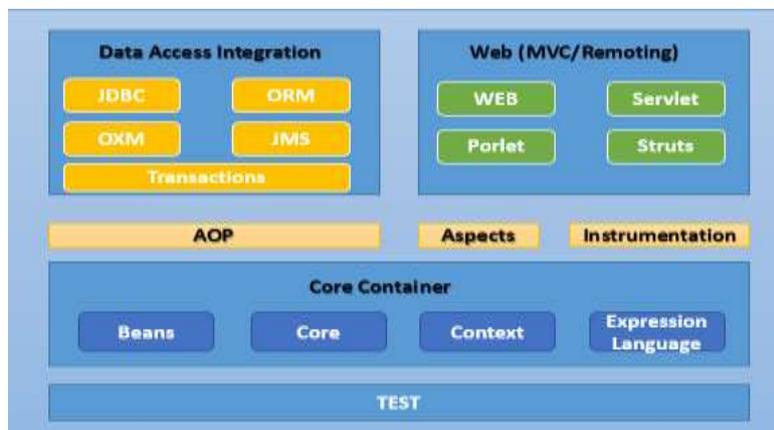


Fig 1. Spring Frame Architecture

Let discussion about Spring Frame Architecture that first core Container and then after Data Access Integration and Web MVC. Now the Core Container consists of the Core, Beans, Context, and Expression Language modules [7]. The Core Module Provides dependency Injection features and The Bean Module provides Bean Factory Pattern. The Context module dimensions on the compact base provided by the Core and Beans modules and it is a medium to access any objects defined and configured. And last The Appearance Language module offers a powerful expression language for querying and controlling an object graph at runtime. The Data Access/Integration layer contains of the JDBC, ORM, OXM, and JMS. The Web layer involves of the Web, Web-Servlet, Web-Struts, and Web-Portlet modules [8].

III. STRUTS FRAMEWORK ARCHITECTURE

This framework splits web system into three layers: Model, View and Controller. Model contains of JavaBeans, EJB; [8]View consists of JSP files; Controller is conceded out by Actions. Struts architecture can be shown as below:

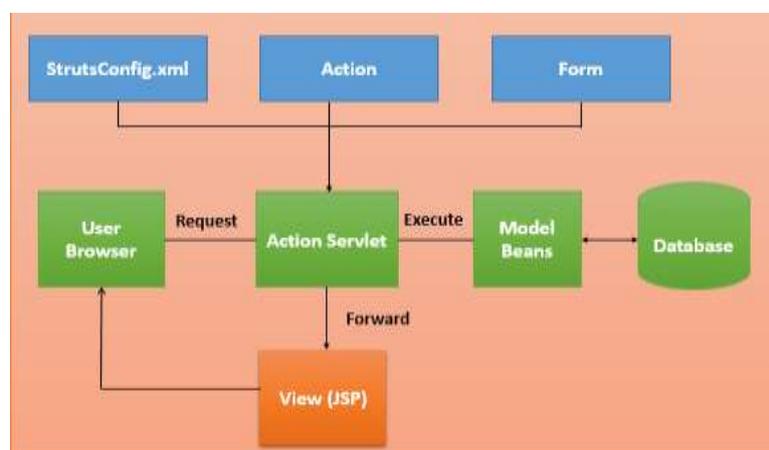


Fig 1.1 Struts Framework Architecture

IV. HIBERNATE FRAMEWORK ARCHITECTURE

This framework moderates the complication and trouble while manipulating the JDBC and SQL data. It maps Java classes to database tables professionally. It is mostly connected with databases [9].

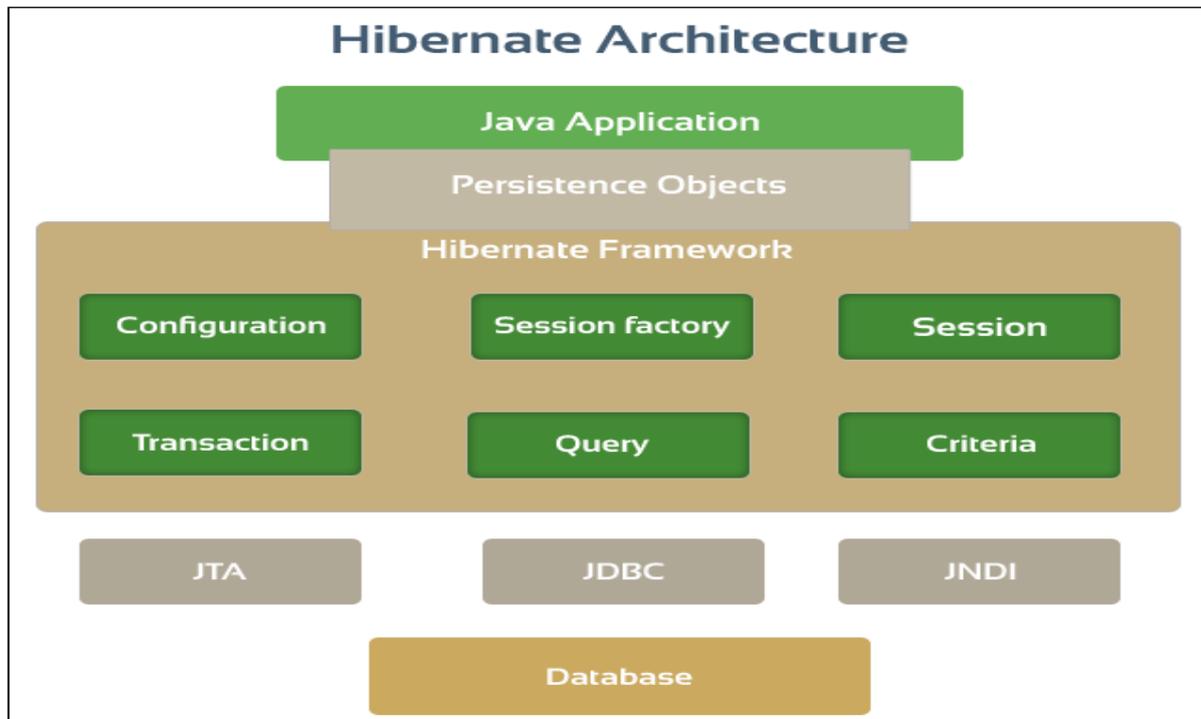


Fig 1.2 Struts Framework Architecture

V. JAVA FRAMEWORK ADVANTAGE

A variation of frameworks have been suggested to define in a general way video analysis methodologies implemented in software. Java-based Web improvement has been filled by frameworks of every kind. It has been ages since I 'm saying a Web application being industrialized without any framework being recycled. Name it and there's a Java framework that privileges to do it. Essentially there might two or three that do the same thing. In this article, I'll take a closer look at the framework approach to development and some of the more popular Java Web frameworks available [10].

Struts: you want a group of taglibs that produce form fields and so forth, Struts is possibly the better choice. Our User Interface is typically click-driven and light on data and validation. It seems to me that peak individuals run into problems with Struts when they start touching a lot of data from HTTP into the model (2007, September). Struts is a refined framework contribution the easy 2 develop, structured view/presentation layer of the MVC applications. Advanced, strong and accessible view framework underpinning reuse and separation of concerns to certain extent.

Spring: Spring provides Aspect Oriented programming, it also solves the separation of concerns at a much bigger level. It allows the programmer to add the features (transactions, security, database connectivity components, logging components) etc., at the declaration level. Spring framework takes the concern of providing the input parameters required for the method contracts at runtime reducing the coupling between various modules by a method called dependency injection / Inversion of Control [11].

VI. CONCLUSION

In this review paper that I have presented an original abstract interpretation framework, which is generic in terms of the source language use means Java programming language. Spring offers a reliable way of handling business objects and inspires good put into practise such as programming to interfaces, rather than education classes. As the above stated, in this paper it programs much more overall function module of document management based on advanced supposed of life cycle management. Spring and Struts provides the help of the user for development, debugging and testing the software.

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THE STUDY AND ANALYSIS OF INDIVIDUAL EXTENT OF UTILIZATION OF CREDIT CARDS WITH REFERENCE TO COMMERCIAL BANKS IN AND AROUND PUNE CITY

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ABSTRACT

The credit card system, in its simplest form is a method of obtaining credit on hire purchase, whereby the cardholder can make purchases on credit up to an amount agreed by him with the credit card company by presenting the card in lieu of cash. Hence credit cards are termed as convenient money and plastic money. The best way to pay is the slogan is that credit card services, No doubt credit card are a new means of consumer finance. The American Express Bank therefore projects that its “credit card is not plastic, its prestige”. Banks in conjunction with credit card associations such as Visa and Master card, issue general-purpose credit cards. Department stores also issues credit card to be used for purchases at that particular store. A credit card is part of a system of payments named after the small plastic card issued to users of the system. The issuer of the card grants a line of credit to the consumer (or the user) from which the user can borrow money for payment to a merchant or as a cash advance to the user.

The present study is undertaken to know how far this service reaches the customers, their responses towards the using Credit Cards, their attitude towards the usage of the Cards and the various problem faced by them in using the Card.

Keywords: Credit Card, Customer Behavior, Customer Expectations, Bankers Role In Credit Card Payments, Individual Liability.

I. INTRODUCTION TO THE TOPIC

The credit card system, in its simplest form is a method of obtaining credit on hire purchase, whereby the cardholder can make purchases on credit up to an amount agreed by him with the credit card company by presenting the card in lieu of cash. Hence credit cards are termed as convenient money and plastic money. For the credit cardholder, credit cards are an innovative way to pay for the purchases. They can go for instant purchases without checking their liquidity. Really sense of feeling assured is there. With credit cards in pocket, emergencies are not felt so by cardholders. They exude a sense of confidence. Perhaps taking the use of the above feeling Can card tells, “You won’t need anything else. To ensure that one feels assured, the American Express Card tells, “Don’t leave home without it”. The best way to pay is the slogan is that credit card services, No doubt credit card are a new means of consumer finance. The American Express Bank therefore projects that

its “credit card is not plastic, its prestige”.

The job of card issuer is to serve as a conduct between the client card holder and the client merchant establishment is affecting a transaction payment being made to receive by, as the case may be the card issuer. Credit cards are fundamentally different from the other payment methods in that they involve extending credit rather than drawing on an existing store of funds. Banks in conjunction with credit card associations such as Visa and Master card, issue general-purpose credit cards. Department stores also issues credit card to be used for purchases at that particular store. Like Electronic Fund Transfer, payment by credit card is not anonymous. Since paying with a credit card does not involve a store of funds, deposit insurance and reserve requirements are not directly relevant. The bank that issues the card is liable and thus merchants are paid if the cardholders default. If the issuing bank fails, the credit card association guarantees payment to merchants with outstanding transactions and then has a creditor's claim on failed banks.

The issuer of the card grants a line of credit to the consumer (or the user) from which the user can borrow money for payment to a merchant or as a cash advance to the user. A credit card is different from a charge card, where a charge card requires the balance to be paid in full each month. In contrast, credit cards allow the consumers to 'revolve' their balance, at the cost of having interest charged. Most credit cards are issued by local banks or credit unions, and are the same shape and size as specified by the ISO 7810 standard.

A credit card is a payment card that is accepted by merchants, and which can be read at the point of sale. Credit cards offer revolving lines of credit to cardholder, which means they have the ability to pay balances over time. A credit card is a payment card issued to users as a system of payment. It allows the cardholder to pay for goods and services based on the holder's promise to pay for them. The issuer of the card creates a revolving account and grants a line of credit to the consumer from which the user can borrow money for payment to a merchant or as a cash advance to the user.

Purpose of research: A credit card is different from a Debit card: This card requires the balance available in your bank account. In contrast, credit cards allow the consumers a continuing balance of debt, subject to interest being charged. The main benefit to each customer is convenience. Compared to debit cards and checks, a credit card allows small short-term loans to be quickly made to a customer who need not calculate a balance remaining before every transaction, provided the total charges do not exceed the maximum credit line for the card. Hence, an individual can shop for the amount not available in his bank account. Early experiences prove the above advantages of credit cards to the disadvantages of customers. Hence this research focuses on the disadvantages and the exploitation of Individuals through credit cards.

1.1 Scope

The scope of the research study is only limited to Commercial banks issuing credit cards in Pune city. This Study is limited to the credit card holders of Pune City.

1.2 Origin of the Research Problem

The present study is undertaken to know how far this service reaches the customers, their responses towards the using Credit Cards, their attitude towards the usage of the Cards and the various problem faced by them in using the Card.

1.3 Interdisciplinary Relevance/ Previous Research Done

Credit cards appeals to different research interest in the several disciplines of behavioral science. The history of credit cards growth is examined and an economic model of a rationed market is developed in a critique of research on users characteristics. The study also focuses on the effects of credit card on other social and economic variable and gives special attention to the impact on consumption and demand for money. Lastly, credit cards are observed as an introduction the electronic money era.

II. REVIEW OF RESEARCH & DEVELOPMENT IN THE SUBJECT

2.1 International Status

- 1) **Bowers and Crosby (1979)** also conducted the same study pertaining to time preference. Individuals who preferred redistribution of expenses to meet future income or in other words those who prefer to buy on credit, normally allowed interest charges on credit card use. These two studies (Becker, 1965; Bowers and Crosby, 1979) showed that credit cards were used as a medium of exchange that provided short-term revolving credit in order to purchase goods or services.
- 2) **Kaynak and Ugur (1984)** conducted a cross-cultural study on cardholders' attitudes among Canadians and Americans. In their study, credit card usage behavior between Canadians and Americans was evaluated. Their results showed that both populations of the cardholders perceived credit card as useful because cards were safer than cash, and help them to pay for impulsive purchases. Both the American and Canadian cardholders showed the same pattern regarding attitudes towards ownership of credit cards.
- 3) **Chebat, Laroche, and Malette (1988)** also conducted another cross-cultural study between English-speaking and French-speaking Canadians. In their study, a comparison of attitudes towards credit cards usage was made. Various attitudinal statement on the card usage showed that cardholders developed an attitude of using credit cards only under emergency situations for both groups. The two samples indicated that a user's financial situation and preference toward credit cards were the main concern in card usage. The English-speaking group was more concerned about costs, accuracy, safety, practicality and facilitation, whereas the French-speaking group was more concerned about cost, accuracy, over consuming, and over spending that would indirectly affect their consumption behavior. The study also indicated that income and education were positively related to frequency of credit card usage.
- 4) **In Accenture's view**, today's emerging environment means card payments organizations seeking to achieve high performance have no choice but to transform their business, operational and technological models. Merely adapting to the new environment is not enough -only transformation will enable them to achieve their strategic objectives, build differentiation, and enhance their operational and financial agility. In terms of building business models to deliver true innovation, our experience shows that the ability to create partnerships and listen to clients will be absolutely key. As regards the operating model, critical actions include switching the back office from a product-centric to process centric focus, industrializing key processes, and adopting new sourcing strategies to increase flexibility and improve alignment between capacity and demand. And in transforming technological models, payments organizations must realize that 'fixing' legacy systems can only take them so far -and that replatforming is the most effective approach.

2.2 National Status

- 1) **M. Reddy and H. Ramana** in their article “Marketing approach in Banking” states that banking industry indirectly can survive only by adopting efficient marketing strategy. These strategies are used to gain the positive response of the customers and to win the positive competitive market in future.
- 2) **Sanjay Shankar** in his article, “Marketing of Banking Services” ,discusses the necessity of marketing of banking service such a frequent meeting with customers, marketing services to attract NRI deposits and application of special technique etc.
- 3) **R.Sangeetha’s** study is based on the “Customer awareness and satisfaction regarding services rendered by commercial bank with reference to State Bank of India and ICICI Bank”. It reveals that gender, occupation, monthly income, type of account and period of holding account with bank is not associated with awareness level. On the other hand there is association between ages, education al qualification awareness level.
- 4) A study conducted at Purdue University by **Prof. Richarda fein bery** of purchase of Purdue’s Department of consumer science and retailing. He found that credit cards to lead over spending and impulse buying. “Simply carrying credit cards or being around them can stimulate consumers not only to spend but to spend freely and quickly
- 5) **Manas Ratha1 (1997)**, in his research work The Credit Card Model studied usage of credit cards and its conceptualization of credit card system. He discussed the system and stock flows in the credit card which helps to identify the important variable in the system such as balance payable, credit card purchase, interest charges and other payments.
- 6) **James (2008)**, in his article Growth of Plastic Money: Prospects and Problem had discussed economic and business prospects and problems involved in the plastic money market. In his work, it clearly studied the basic terms, plastic money, electronic payment and credit cards. The study also focused on plastic money penetration in India, reasons for growth and strong future for plastic money.
- 7) **Subramanian Ravi and Shiva Kumar (2010)** in their work It’s Your Number..... It’s Your Life! have been analysed plastic cards (both credit and debit cards) which posed universal presence and acceptance are being used for a variety of general purchases including for cash withdrawals.
- 8) **Russell G Smith4 (1997)**, in his paper Plastic Card Fraud had analyzed the plastic card industry criminals, plastic card frauds, or crimes of deception committed through the use of credit card, debit cards and stored value cards

III. SIGNIFICANCE OF THE STUDY IN THE CONTEXT OF CURRENT STATUS

In India, the number of valid credit cards in circulation is more than 475 lakh, the number of transactions is of the order of 6682 lakh and the amount of transactions Rs. 97,958 crore in the year 20012-13. Over the past 5 years, there has been a substantial increase in credit card transactions. The following charts depict the growth of both credit and debit cards business in India. The debit cards have had a slow start and their growth only took off in the last one year. On the other hand, the credit cards grew faster since inception with the growth turning even sharper in the latest year.

IV. OBJECTIVES OF THE STUDY

1. To examine the relationship between credit cardholders' attitudes and their usage level.
2. To study the relationship between customer's income level and credit worthiness.
3. To know the impact of Credit card on customers.
4. To analyze the factors causing the financial risk and operational risk.
5. To examine the protective measures existing to manage the risk exposure of credit card users

V. METHODOLOGY

5.1 Research Type

A research design is a clear plan about the research. The type of the study is Exploratory.

5.2 Method of Data Collection

The task of data collection begins after a research problem has been defined and research design chalked out. The data collected are primary and secondary data.

5.3 Sampling Methods

The sampling design of the research study consists of the following categories namely employed persons, professionals and others. The respondents of the sample size are 100.

5.4 Sample Design

Under Non probability technique convenience sampling is being used. When the population elements are selected for inclusion in the sample based on the ease of access, it is called Convenience sampling. This method is also known as accidental sampling because the respondents whom the researcher meets accidentally are included in the sample.

5.5 Working Hypothesis

H1: The cause and effect relationship between credit cards and spending has yet to be adequately explored.

H2: Credit card holders are doing Extra expenses due to facility of credit received through credit cards.

H3: Credit card holders are increasing their monthly liabilities through credit cards.

H4: Income of Commercial Banks from issuing credit cards is increasing day by day.

5.6 Statistical Tools Adopted

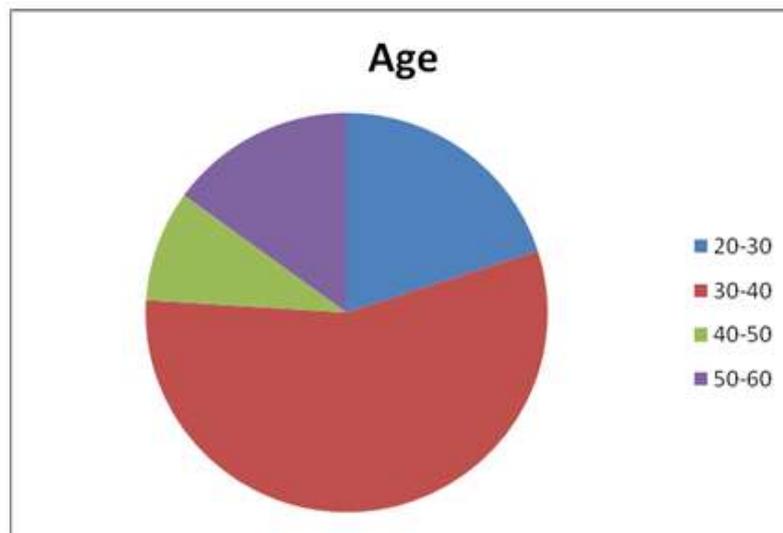
The following statistical tools were employed for data analysis and interpretation of the survey data.

- Bar Diagram
- Ogive Curve
- Pie Diagram

VI. QUESTIONNAIRE & DATA ANALYSIS & INTERPRETATION

6.1 What is your age?

Age Limit	No. of Respondents
20-30	20
30-40	56
40-50	9
50-60	15

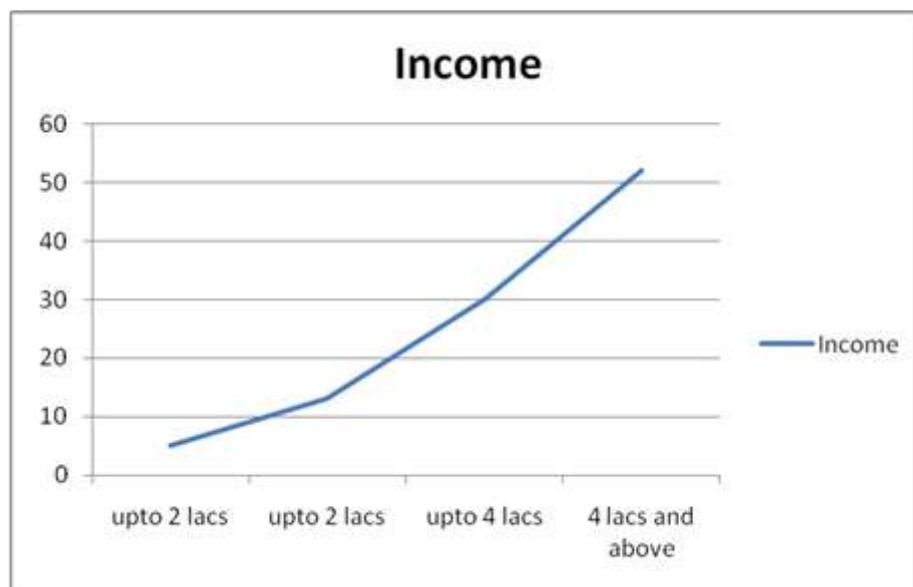


Interpretation: Diagram shows that out of 100 respondents people there are 56 people whose age is in between 30 -40 years are using credit cards.

People in the age group are risk takers and want credit card for enjoyment / shopping.

6.2 Rate Your Income Per Annum

Income (per annum- in lacs)	No. of Respondents
Upto 2 lacs	5
Upto 3 lacs	13
Upto 4 lacs	30
4 lacs and above	52



Interpretation: Graph shows that out of 100 respondents 52% people are having their income more than 4 lacs and above. Which shows that credit card has utilization for the employees who has higher income.

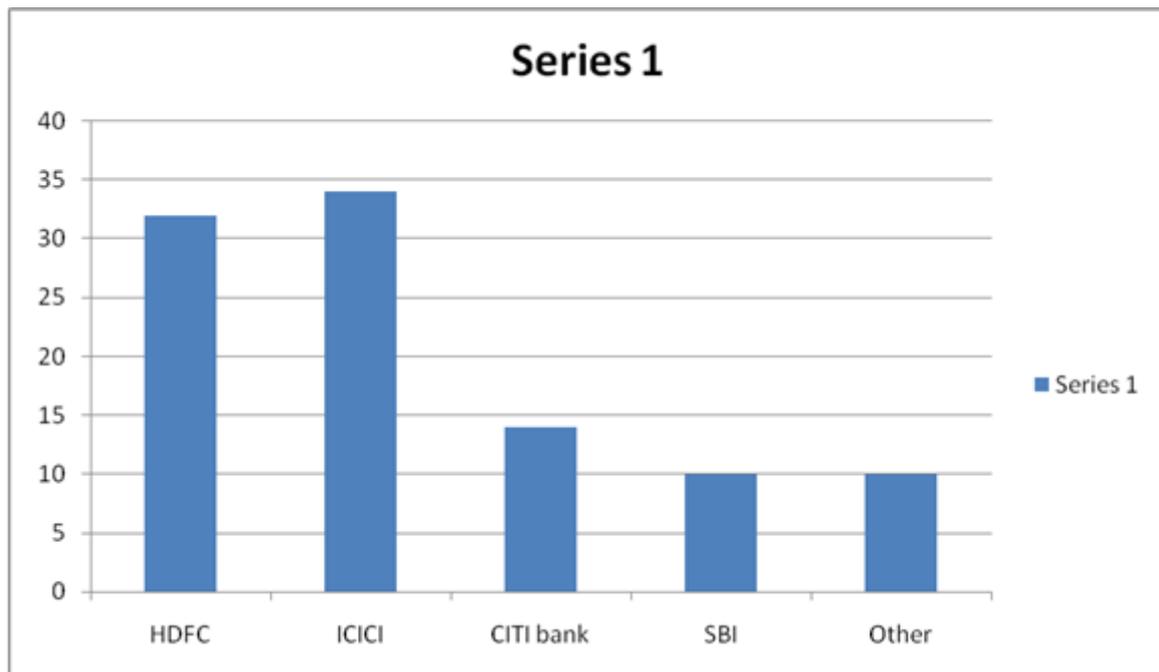
6.3 What Are The Reasons For Using Credit Card Facility?

Name of banks	No. of Respondents
Need	26
Enjoyment	34
Status	25
Peer Influence	15
Total	100

Interpretation: Table shows that out of 100 respondents. There are only 26 % respondents who use for need. 34 % respondents use it for enjoyment, 25 % respondents use it for status and 15 % respondents use it due to peer influence.

6.4 Give Your Preference Of Credit Card?

Name of banks	No. of Respondents
HDFC	32
ICICI	34
CITI bank	14
SBI	10
Other	10



Interpretation: Graph shows that out of 100 respondents, 34 % respondents are giving preference to ICICI bank credit card, 32 % respondents are giving preference to HDFC, means credit cards of ICICI and . There are only 10% respondents who use 100% credit limit.

6.5 How Many Credit Cards Do You Have?

No of credit cards	No. of Respondents
Single Credit Card	53
Two Credit Cards	23
Three Credit Cards	24
Total	100

Interpretation: Table shows that out of 100 respondents, 53% respondents prefer to have single credit card, 23% respondents have 2 credit cards, 24% respondents have 3 credit cards, which shows .

6.6 How Often Do You Use The Credit Card?

Credit limit	No. of Respondents
Once in week	54
Twice in week	15
thrice in week	15
occasionally	16

Interpretation: Table shows that out of 100 respondents, 54% respondents use it once in a month, 18% respondents use it twice in a month, 15% use it thrice in a month and 21 % use it occasionally.

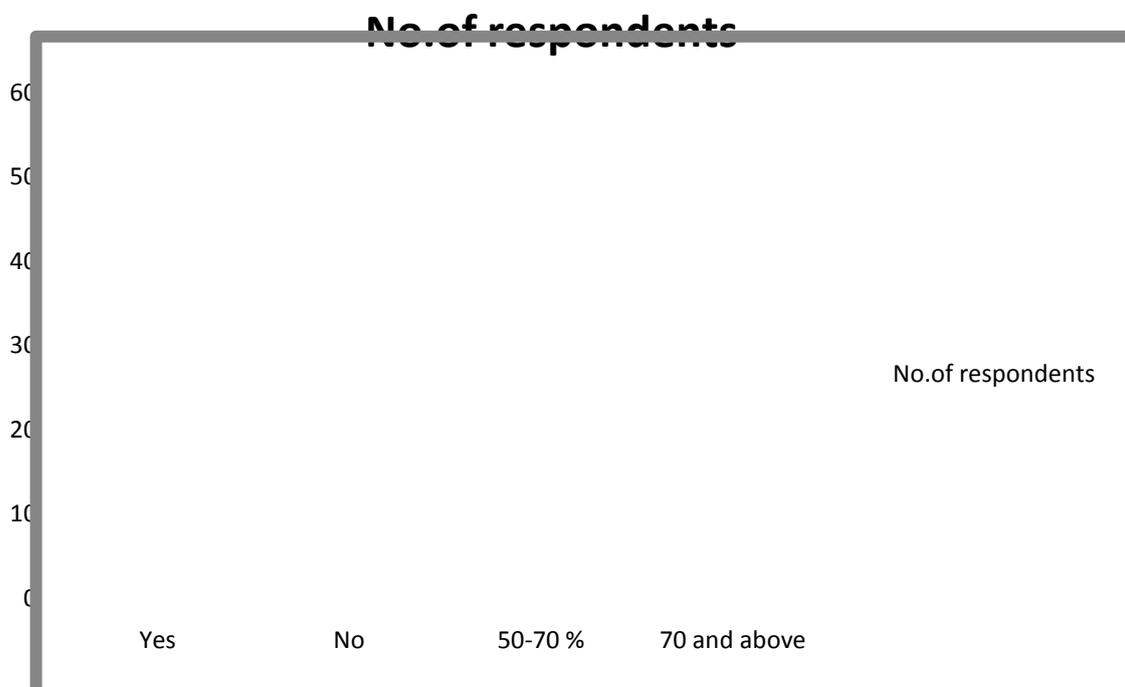
6.7 How Did You Attract To Use Credit Cards?

Credit limit	No. of Respondents
by bank	45
friends	25
media	16
others	14

Interpretation: Table shows that out of 100 respondents 45% respondents are attracted to use credit cards through banks, 25% respondents are attracted to use credit cards through friends, 16% respondents are attracted to use credit cards through media & 14% through others.

6.8 How Much Credit Limit Do You Use?

Credit limit	No. of Respondents
<30%	14
30-50 %	24
50-70 %	52
70 and above	10



Interpretation: Graph shows that out of 100 respondents, 52% respondents who use 50-70% credit limit out of sanctioned credit limit, 24% respondents use 30-50% of credit limit and 14% use less than 30% credit limit. There are only 10% respondents who use 100% credit limit.

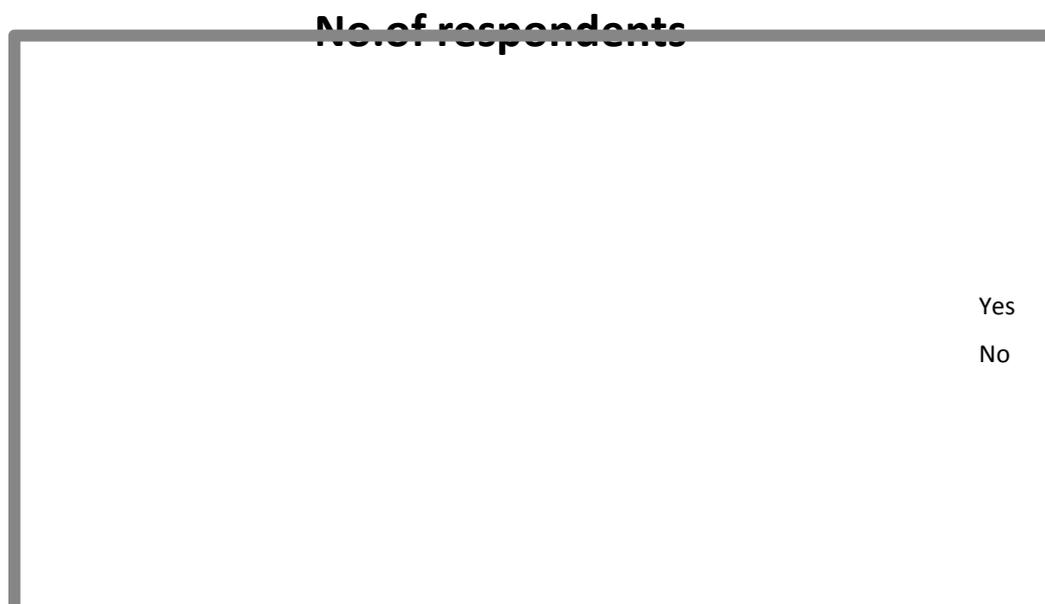
6.9 Are You Satisfied With The Credit Card Facilities Of Your Bank?

satisfaction level	No. of Respondents
satisfied	52
Partly satisfied	32
Partly Dis satisfied	12
Dis satisfied	04

Interpretation: Table shows that out of 100 respondents, 52% respondents are satisfied with the facilities, 32% are in Partly satisfaction & 12% are in Partly dissatisfaction due to customer support facilities

6.10 Are You Aware About Defaulter Charges of Bank?

Awareness of Defaulter charges	No. of Respondents
Yes	77
No	18



Interpretation: Diagram shows that out of 100 respondents, 77% respondents are aware about Defaulter charges, 23% are unaware.

6.11 Do You Have Any Good Or Bad Experience About Credit Card With Your Bank?

Experience	No. of Respondents
Good	62
Bad	38

Interpretation: Table shows that out of 100 respondents, 62% respondents have good experience and 38% respondents have bad experience regarding to banks

6.12 Good /Bad Experience

a) Nature of Good Experience

Frequent reminder for payment, Kind cooperation from Staff

b) Nature of Bad Experience

Arrogant behavior during recovery & unsatisfied answers about queries.

Interpretation: Credit card holders have good as well as Bad Experience about banks

6.13 When Do You Pay Credit Card Bills

Payment through reminder	No. of Respondents
Self reminder	78
Bank reminder	22

Interpretation: Table shows that out of 100 respondents, 78% respondents pay Credit card bills by keeping self reminder and 22% respondents depends upon banks reminder

6.14 If You Are Defaulter In Credit Card Payment In Last Year Please Specify?

Defaulter in last year	No. of Respondents
Not Defaulter	52
one time Defaulter	23
Two times Defaulter	15
Three times Defaulter	10

Interpretation: graph shows that out of 100 respondents, 52% respondents are not defaulter in last year, 23% respondents are one times defaulter, 15% are two time defaulters and 10% are three times defaulter

6.15 If You Are Defaulter Please Specify the Reasons

Reason of Defaulter in last year	No. of Respondents
Salary	11
Other Priorities	31
Improper Fund management	19
Ignorance of reminder	16

Interpretation: Table shows that out of 77 Defaulters, 11 respondents are defaulter due to irregularities in salaries, 31 are defaulter due to other priorities, 19 due to fund management and 16 due to ignorance of reminder.

6.16 As A Protective Measure For Defaulter Which Option You May Choose?

Protective Measures	No. of Respondents
Full settlements	42
Switching credit card	36
Discontinue the facility for few days	12
Completely Stop its use	10

Interpretation: Table shows that out of 100 respondents 42% respondents will go for Full settlement, 36% will choose the option of switching credit card, 12% will go to discontinue the facility & 10% respondents will stop its use.

6.17 What Are Your Expectations From You Bank?

Respondents are expected the following areas

- a. Clear terms and conditions
- b. Timely reminders
- c. Good customer relations
- d. Customization of credit limit
- e. Help desk support

VII. CONCLUSIONS**7.1 Findings**

1. People in the age group are risk takers and want credit card for enjoyment / shopping.
2. There are only 10% respondents who use 100% credit limit.
3. 52% respondents are satisfied with the facilities, 32% are in average satisfaction & 16% are in dissatisfaction due to customer support facilities
4. 77% respondents are aware about Defaulter charges of banks
5. 78% respondents pay Credit card bills by keeping self reminder
6. Promotional activities of HDFC and ICICI bank are dominant as compared to other banks.

7.2 Suggestions

1. Banks should satisfy the expectations of card holders regarding to Terms and conditions of credit cards, bank should give Customization of credit limit and maintain good help desk support.
2. Customers should not completely depend on the credit card facility availing maximum credit limit.
3. Customer should manage funds systematically dividing the proportion of credit card and other priorities.

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A STUDY OF GOVERNMENT SUBSIDIES, ANALYSIS OF AWARENESS & UTILIZATION OF SUBSIDIES BY THE FARMERS IN WESTERN MAHARASHTRA

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ABSTRACT

Maharashtra has diverse agro climatic conditions suitable for the cultivation of a wide range of crops, and a progressive farming community. The State has a large urban population with high purchasing power. It is one of the major horticulture States in India, with more than 13 lakh ha under different fruit crops. The State is the largest exporter of Thompson seedless grapes, Alphonso mangoes, onions and long stem cut flowers. Maharashtra's Gross State Domestic Product (GSDP) at current prices for 2008-09 is estimated at Rs. 692479 crores and contributes more than 13% cent of national GDP. Agriculture and allied activities contribute nearly 12% per cent to the State's income, although 55% of the population is dependent on them. At the grassroots level, there are more than 45,000 agro processing cooperatives. Thus, Maharashtra is one of the country's leaders in agro-industry in general, and in food processing in particular. There is tremendous potential for much higher value addition through processing. This research is limited only to the farmers of Western Maharashtra including the districts like Kolhapur, Sangli, Satara, Pune and Solapur. Further the study limits to the awareness of Subsidies and its utilization by the farmers.

Keywords: Cultivation, Cash Crops, Farming, Subsidies, Western Maharashtra.

I. INTRODUCTION TO THE TOPIC

Maharashtra has diverse agro climatic conditions suitable for the cultivation of a wide range of crops, and a progressive farming community. The State has a large urban population with high purchasing power. It is one of the major horticulture States in India, with more than 13 lakh ha under different fruit crops. Maharashtra is a pioneer and leader in the use of water saving technology like drip and sprinkler irrigation, and accounts for 60 percent of the total area under drip irrigation in the country. Almost all the area under grapes and more than 60 percent of the area under banana in the state has access to drip irrigation. The State is the largest exporter of Thompson seedless grapes, Alphonso mangoes, onions and long stem cut flowers.

Maharashtra's Gross State Domestic Product (GSDP) at current prices for 2008-09 is estimated at Rs. 692479 crores and contributes more than 13% cent of national GDP. Agriculture and allied activities contribute nearly 12% per cent to the State's income, although 55% of the population is dependent on them. In the food processing sector, Maharashtra has as many as 16,512 small and medium and 322 large scale food processing units. 13 mega projects (not including textiles) have also been approved under the Package Scheme of

Incentives since 2005 with an investment of nearly Rs. 2600 crores. At the grassroots level, there are more than 45,000 agro processing cooperatives. In fact, food products and beverages is one of the major industries in Maharashtra, and contributed 9.7% in terms of total value of output in 2007-08. The food processing sector in the State has attracted Rs. 1039 crores worth of Foreign Direct Investment through 173 projects since 1991. Thus, Maharashtra is one of the country's leaders in agro-industry in general, and in food processing in particular. However, the current level of processing in the State, as in the rest of India, is very low by international standards. There is tremendous potential for much higher value addition through processing.

Agriculture involving domestication of plants and animals was developed around 10,000 B.C Agriculture, also called farming or husbandry, is the cultivation of animals, plants, fungi, and other life forms for food, fiber, biofuel, medicinals and other products used to sustain and enhance human life. Agriculture was the key development in the rise of sedentary human civilization, whereby farming of domesticated species created food surpluses that nurtured the development of civilization.

Agricultural policy describes a set of laws relating to domestic agriculture and imports of foreign agricultural products. Governments usually implement agricultural policies with the goal of achieving a specific outcome in the domestic agricultural product markets. Outcomes can involve, for example, a guaranteed supply level, price stability, product quality, product selection, land use or employment.

1.2 Scope

This research is limited only to the farmers of Western Maharashtra including the districts like Kolhapur, Sangli, Satara, Pune and Solapur. Further the study limits to the awareness of Subsidies and its utilization by the farmers.

1.3 Origin of the Research Problem

The agricultural and related industrial and processing sectors operate today in a new and evolving business and social environment. It is a competitive, consumer-driven environment, global and rapidly changing, with enormous implications for the role of the agriculture sector in the overall food system. It is highly inter-dependent, blending the efforts of many industries to add value to agricultural products. Effective policies must recognize the wide diversity in the agriculture sector itself in Maharashtra, in terms of size, location, financial status, crop and other products produced, managerial abilities, income sources, and goals and aspirations. The problems faced by these groups are widely different and require solutions, tailored to address particular needs.

The Agro-Industrial Policy aims at value addition from agricultural produce by induction of modern technology into food processing, encouraging research and development, minimization of wastage across the food processing chain by development of infrastructure for storage, transportation and processing of agro-food produce to fill in the gaps of supply chain from farm to consumer, and promotion of investment in all these fields. The objective is also to

increase participation of entrepreneurs and farmers in food processing and related sectors, creating new employment opportunities, and increasing incomes, particularly of the rural population

II. REVIEW OF RESEARCH & DEVELOPMENT IN THE SUBJECT

2.1 International Status

1. **(Birner et al. 2009; Davis 2009)** : Agricultural extension, or agricultural advisory services, comprises the entire set of organizations that support people engaged in agricultural production and facilitate their efforts to solve problems; link to markets and other players in the agricultural value chain; and obtain information, skills, and technologies to improve their livelihoods
2. **(Swanson 2008)**. transfer of technology still has relevance, agricultural extension is now seen as playing a wider role by developing human and social capital, enhancing skills and knowledge for production and processing, facilitating access to markets and trade, organizing farmers and producer groups and working with farmers toward sustainable natural resource management practices
3. **(Van den Ban 1998)** Farmers require a diverse range of information to support their farm enterprises. Information is needed not only on best practices and technologies for crop production, which the traditional public-sector extension system provided during the Green Revolution, but also information about postharvest aspects including processing, marketing, storage, and handling
4. **Raabe (2008)** reviewed agricultural extension approaches in India by considering supply-side and demand-side reform aspects. Demand-side aspects explored were governance structures, capacity development, and affirmative action

III. OBJECTIVES OF THE STUDY

1. To find out new areas of opportunities for agricultural business.
2. To study and analyze various government subsidies provided for crop based Agricultural sector.
3. To know the use of technology & fertilizers used in crop cultivation
4. To study financial & Environmental problems faced by farmers
5. To present the guidelines for effective utilization of resources to farmers

IV. METHODOLOGY

4.1 Research Design

A research design is a clear plan about the research. The design used for the study is Exploratory.

4.2 Method of Data Collection

The task of data collection begins after a research problem has been defined and research design chalked out. The data collected are primary and secondary data.

4.3 Sampling Methods

The sampling design of the research study consists of the following categories namely Farmers from each District of western Maharashtra. The respondents of the sample size are 300.

4.4 Sample Design

Under Non probability technique convenience sampling is being used. When the population elements are selected for inclusion in the sample based on the ease of access, it is called Convenience sampling. This method is also known as accidental sampling because the respondents whom the researcher meets accidentally are

included in the sample.

4.5 Working Hypothesis

H1: Farmers uses modern technology and equipment in cross cultivation process

H0: There is less cultivation of land by the farmer due to shortage of resources

H2: Government provides subsidies to various crops every year.

H0: Subsidy does not reach up to the farmers

4.6 Statistical Tools Adopted

The following statistical tools will be used for data analysis and interpretation of the survey data.

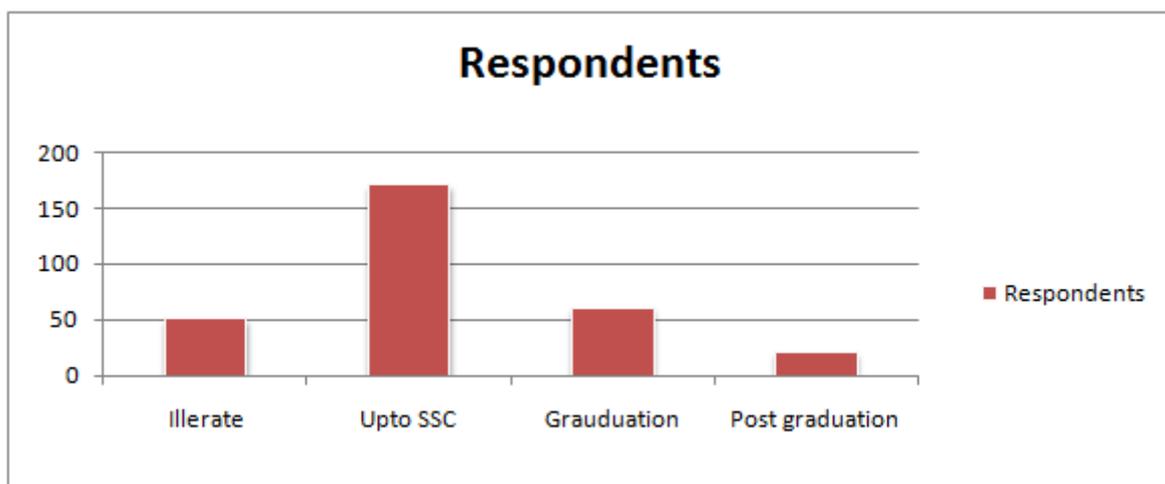
- Bar Diagram
- Pie charts
- Ogive Curve

V. QUESTIONNAIRE, DATA ANALYSIS & INTERPRETATION

5.1 What Is Your Educational Background?

Educational Background	No of Respondents
Illiterate	50
Up to SSC	170
Graduation	60
Post graduation	20

Graph:

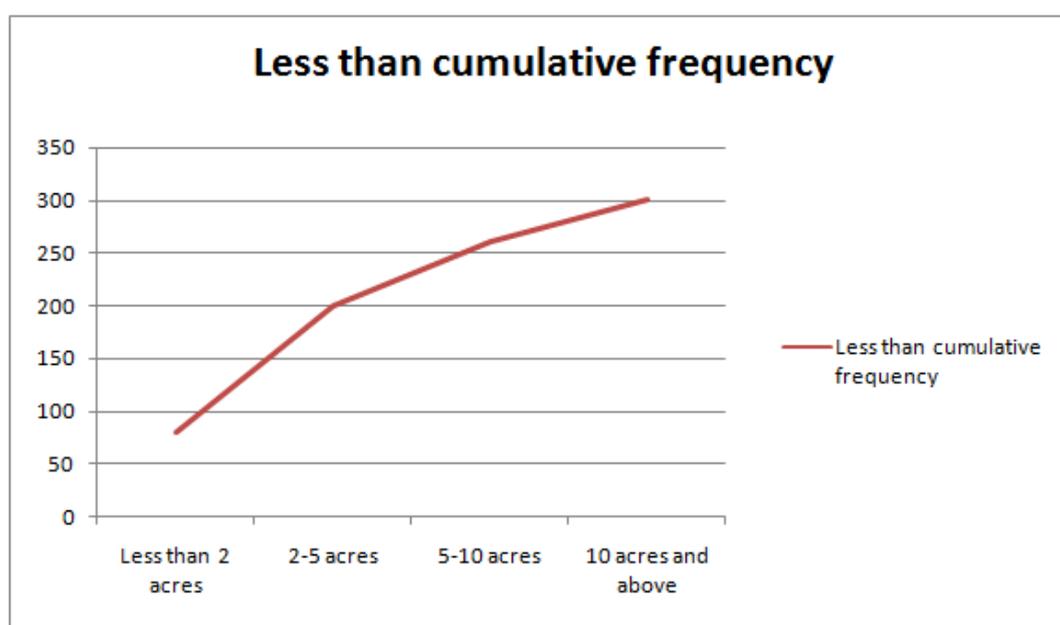


Interpretation: Graph shows that more than 50% farmers who are cultivating the land are educated upto SSC

5.2 How Much Land Do You Own?

Particulars	No. of Respondents	Less than Cumulative Frequency
Less than 2 acres	80	80
2-5 acres	120	200
5-10 acres	60	260
10 acres and above	40	300

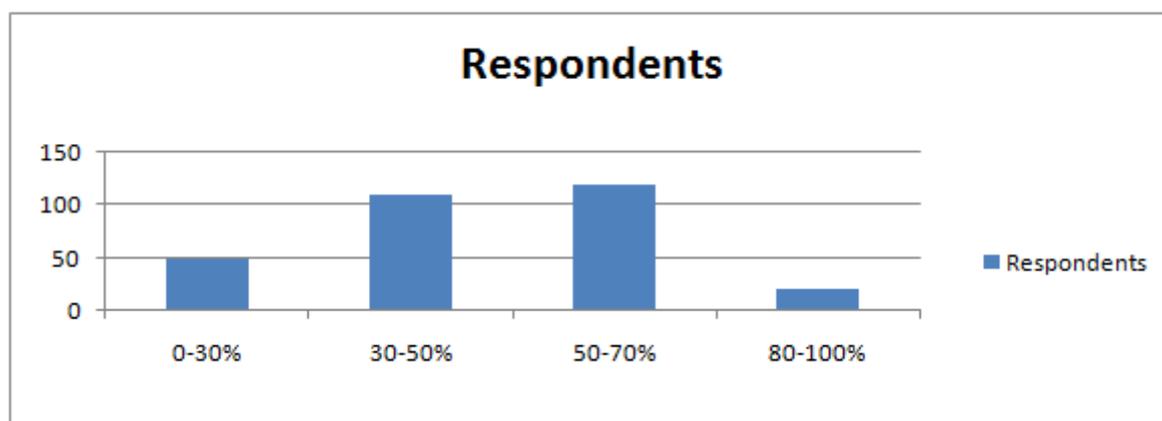
Graph



Interpretation: Graph shows that out of three hundred respondents 66 % respondents have less than 5 acres land. Hence they may find other source of employment.

5.3. Proportion Of Cultivated Land As Compared To Land Owned?

Proportion	No of Respondents
0-30%	50
30-50%	110
50-70%	120
80-100%	20

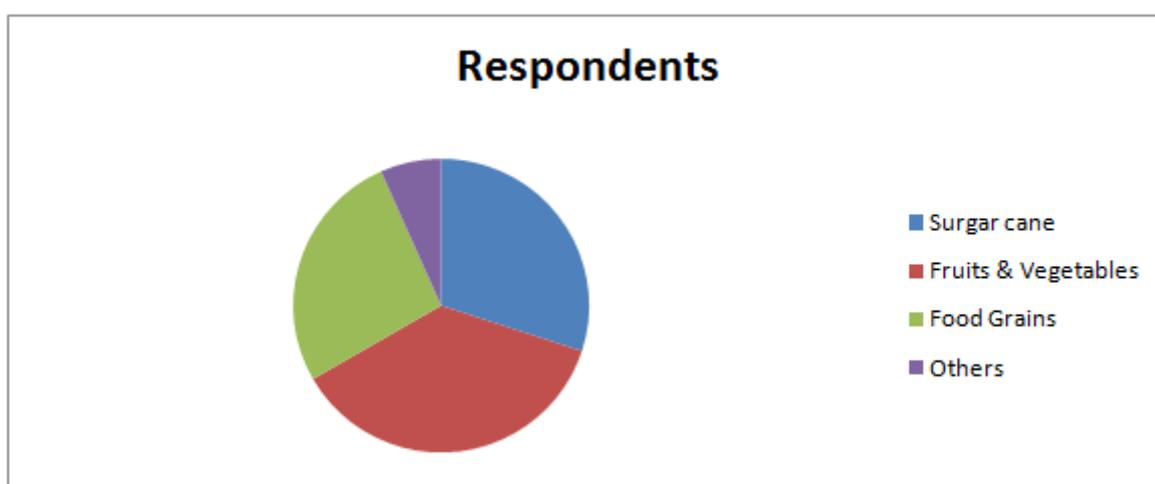


Interpretation : Out of 300 Respondents there are 17 % respondents are cultivating only 30% of proportion of land, 36% respondents are cultivating up to 50% of land and 40% respondents are cultivating in between 50 to 70% of the land. It shows that most of the land is uncultivated for agriculture purpose.

5.4 Which Crop Do You Cultivate In The Farm?

Particulars	No of Respondents
Surgar cane	90
Fruits & Vegetables	110
Food Grains	80
Others	20

Graph

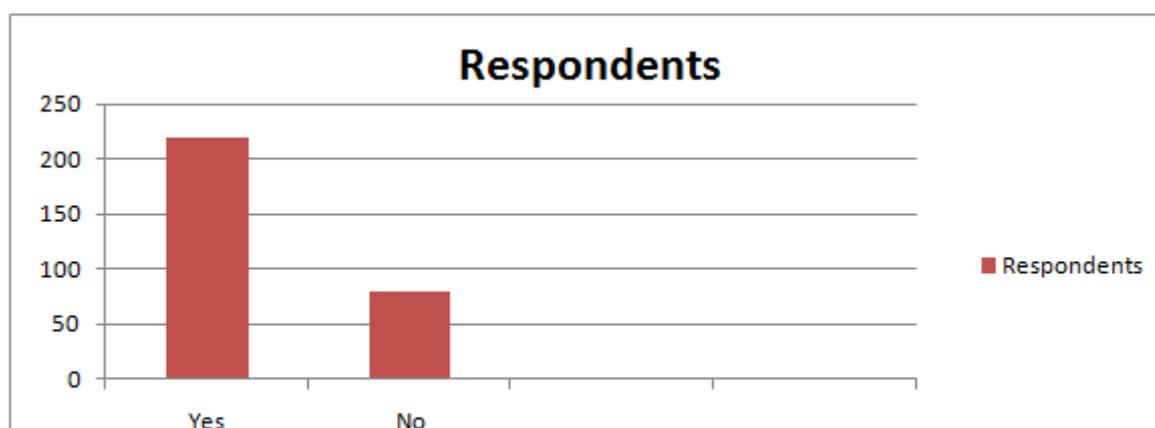


Interpretation: Graph shows that 37% of the respondents cultivate fruits & vegetables and 30% respondents cultivate sugar cane and only 27% respondents are cultivating food grains. It shows that only 67% respondents can take a benefit of the government subsidy.

5.5 Are You Aware About Government Subsidies For Crop Based Products?

Particulars	No of Respondents
Yes	220
No	80

Graph:



Interpretation: 73% respondents are aware about the subsidies of government but proportion of benefit taken by the respondents is only 67% means 6% respondents are unable to get benefit of subsidies.

5.6 Sources of Getting Knowledge of Subsidies

Particular	No of respondents
Friends	50
Agriculture Help Desk	40
Government Officials	60
Media	70

Interpretation: 22% respondents gets from friends , 18% respondents gets knowledge from Agriculture help desks, 27% respondents gets knowledge from of Government officials and 43% respondents gets knowledge from Media, it means Farmers are using new technologies like Televisions, Mobiles, Internet for getting Knowledge of subsidies.

5.7 Utilization /Benefit of Government Subsidies in Farm Cultivation

Proportion	No of respondents
Up to 30%	63
Up to 50%	67
Up to 70%	51
Up to 100%	39

Interpretation: Farmers are not utilizing or taking benefit of 100% Government subsidies due to some resources, or due to Government procedures

5.8 If Not Utilized Government Subsidies Please Specify the Reasons

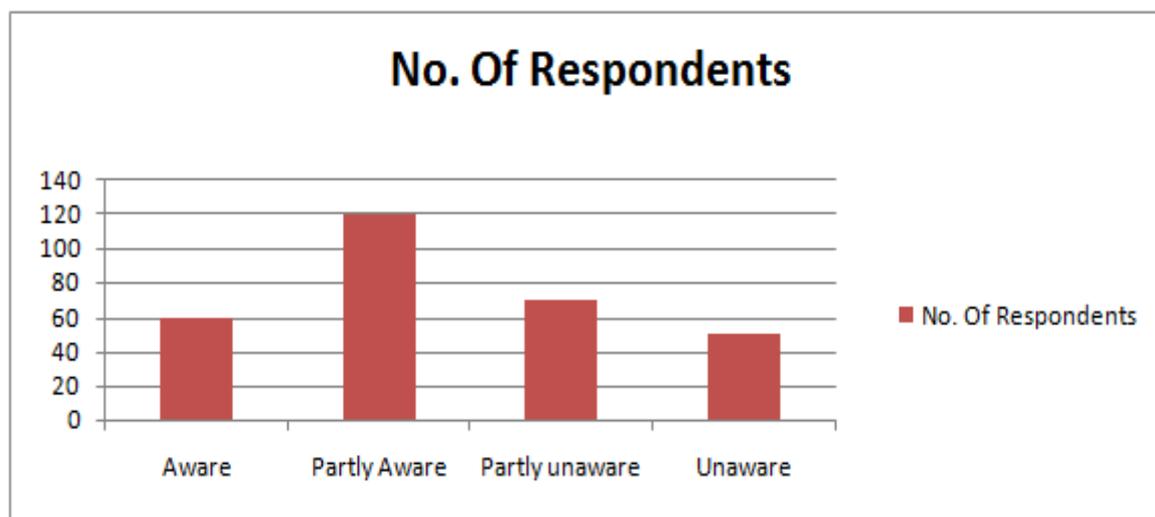
Reasons of non utilization	No of respondents
Shortage of Resources	90
Due to Govt. Officials	60
Others	70

Interpretation: It shows that government subsidies may be delayed to shortage of resources & govt. lengthy process.

5.9 Are You Aware About Modern Technology To Be Used In Agriculture?

Awareness	No. Of respondents
Aware	60
Partly Aware	120
Partly unaware	70
Unaware	50

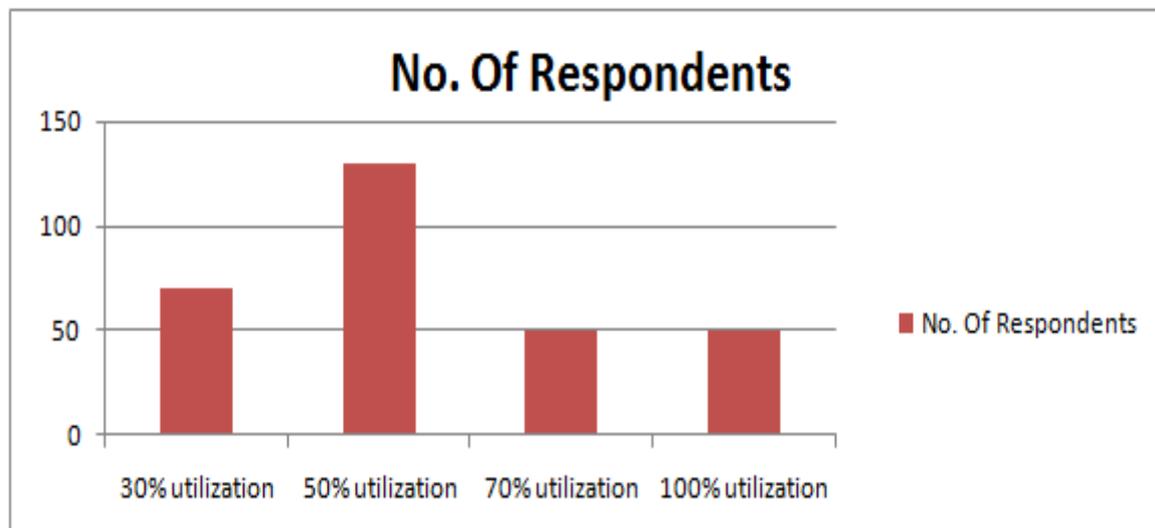
Graph:



Interpretation: Graph shows that 16% respondents are still unaware about modern technologies to be utilized in agriculture. Means there is awareness about modern technology in Respondents

5.10 Utilization of Modern Technologies in Agriculture

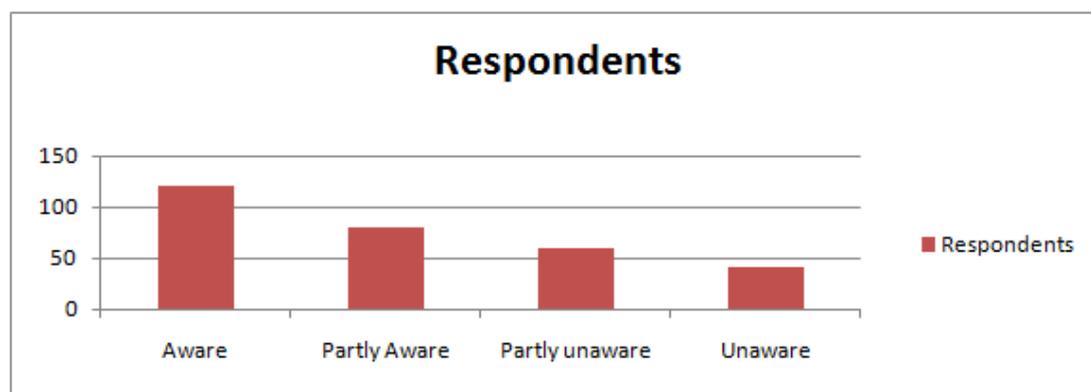
Utilization	No. Of respondents
30% utilization	70
50% utilization	130
70% utilization	50
100% utilization	50

Graph:

Interpretation: Graph shows that framers are not using modern technology for cultivation due to financial shortage.

5.11 Are You Aware About Advanced Fertilizers?

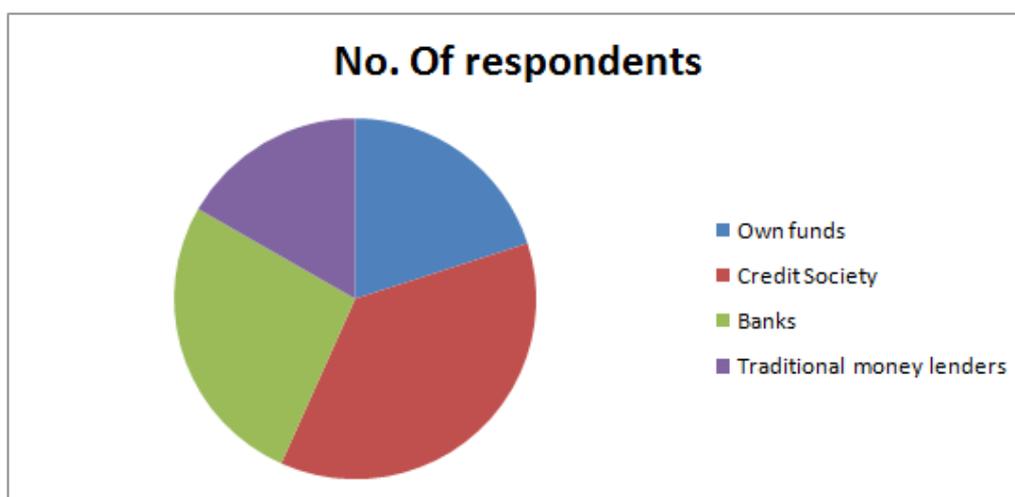
Awareness	No. Of respondents
Aware	120
Partly Aware	80
Partly unaware	60
Unaware	40

Graph:

Interpretation: Graph shows that farmers have awareness of fertilizers.13% of respondents are unaware about advanced fertilizers.

5.12 How Do You Fulfill Financial Need In Cultivation Of Land?

Financial Need	No. of respondents
Own funds	60
Credit Society	110
Banks	80
Traditional money lenders	50

Graph:

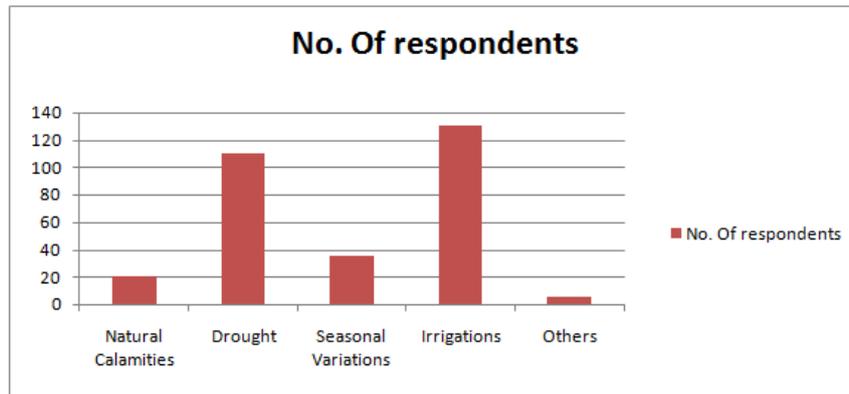
Interpretation: Diagram shows that 16% respondents have their own funds to invest in cultivated land and 86% respondents depend upon credit society, banks and traditional money lenders.

5.13 Are You Facing Any Environmental Problems?

Particulars	No. of respondents
Yes	300
No	0

5.14 Please Mark Your Response For The Following Environmental Problems.

Environmental Problems	No. of respondents
Natural Calamities	20
Drought	110
Seasonal Variations	35
Irrigations	130
Others	05

Graph:

Interpretation: Graph shows that maximum farmers of western Maharashtra are facing a problem of drought and irrigation system

VI. CONCLUSION**6.1 Findings**

1. More than 50% farmers who are cultivating the land are educated up to SSC
2. 66 % respondents have less than 5 acres land
3. Most of the land is uncultivated by the farmers.
4. Farmers are using new technologies like Televisions, Mobiles, and Internet for getting Knowledge of subsidies
5. 16% respondents are still unaware about modern technologies
6. Most of the respondents aware about the advanced fertilizers but due to shortage of funds they are unable to used them.
7. Maximum farmers of western Maharashtra are facing a problem of drought and irrigation system

6.2 Suggestions

1. Government should take efforts to over come drought problems in Western Maharashtra and they should also concentrate on effective irrigation system.
2. Process of Sanctioning subsidy to the Farmers should short and immediate.
3. Awareness and promotion of help desks should increase.
4. Proper Information of Sources of Finance should be given to the farmers so that modern technology in agriculture will be used.

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IMPLEMENTATION OF NANOFUIDS IN PLATE HEAT EXCHANGER: A REVIEW

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ABSTRACT

Nanofluids are colloidal suspensions of nano- sized particles in the conventional base fluid such as water, engine oil and ethylene glycol. The nanoparticles include the chemically stable metals, metal oxides and non-metallic. In the present study, the literature available on the applications of nanofluids in plate heat exchanger have been compiled and reviewed. However, this paper elaborates the thermal performance of nanofluids in plate heat exchangers (PHEs) based on experimental studies. The aim of this review to focus on experimental investigation on variety of nanofluids as a cooling media in plate heat exchanger based on available literature.

Keywords: *Chevron-Type, Exergy Loss, Heat Transfer Coefficient, Nanofluids, Plate Heat Exchanger (PHE).*

I INTRODUCTION

Heat exchangers are those appliances that serve for controlling the temperature of a substance by adding or removing the thermal energy. The heat transfer among the media caused by temperature difference only, without the use of any external energy. A heat exchanger may be classified as: I. a direct contact type heat exchanger and ii. An indirect contact type heat exchanger. In direct contact type heat exchangers, the two media, between heats is to be exchanged, are in direct contact, e.g. cooling towers. In an indirect contact type heat exchanger, the two media, between heat is exchanged, are separated by a wall [1, 2]. A plate heat exchanger is an indirect contact type heat exchanger.

The plate heat exchangers (PHEs) habitually a set of thin corrugated metal plates with port holes at their corners providing the means of flow for the two fluids media, between heat transfers shall take place. These plates are assembled into a fix frame plate and a movable pressure plate and compressed by tightening bolts. Plate heat exchangers may be fabricated in gasketed or welded design characterized by the model in that the flow channels for the two heat exchanging media are sealed. The plates are provided with a bordering gasket that seals the inter plate channel .When these plate packs are compressed, the fluids flow into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature. The hot and cold fluids flow in alternate channels and the heat transfer takes place between adjacent channels. The

corrugation of the plates promotes turbulence inside the channels and improves the mechanical strength of the plate pack [3, 4].

In the beginning, the enhanced convective heat transfer coefficient and thermal conductivity of liquids was achieved by mixing micron sized particles with a base fluid [5]. However, rapid sedimentation, clogging, erosion and high-pressure drop caused by these particles hindered its application practically. An addition of nanoparticles in a base fluid results an impressive augmentation in the thermo physical properties of base fluids. Nanofluids, that are a colloidal mixture of nanoparticles (1–100 nm) and a base liquid (nanoparticle fluid suspensions) is the term first coined by Choi in the year 1995 [6] at the Argonne National Laboratory. The nanofluids exhibited superior thermal properties over conventional fluids.

II RELEVANCE OF NANOFLUIDS

Convective heat transfer coefficient is utmost important parameter that attracts many researchers to investigate the heat transfer augmentation in nanofluids, relevant to numerous engineering applications such as- nuclear systems cooling, chemical process and microelectronics. Owing to improved heat transport properties, nanofluids are believed to be relatively potential fluids that attribute to enhance heat transfer coefficients. However, the additions of nanoparticles merely in the base fluids not impinge on the thermal conductivity but also the viscosity and the specific heat capacity.

A few review papers have been discussed on the application of nanofluids in heat exchangers by G. Huminic and A. Huminic [7]. In present study, we try to particularly review the application of various nanofluids in plate heat exchanger, in more details. However, probably no comprehensive literature available on application of nanofluids particularly in plate heat exchanger much. Moreover, the purpose of this paper is to explain the application of nanofluids in plate heat exchangers based on experimental investigations.

2.1 Experimental investigations on plate heat exchanger

Tiwari et al. [8] has compared the ratio of heat transfer coefficient and ratio of pressure drop of various nanofluids experimentally for different concentrations and different rates of flow in PHE. Various nanofluids, in this present study, are CeO_2 , Al_2O_3 , TiO_2 and SiO_2 at the concentrations ranging from 0.5- 3.0 vol. % with different flow rates, ranging from 1.0 - 4.0 lpm for hot water flow rate of 3 lpm. For the investigation of heat transfer and pressure drop characteristics, an experimental apparatus has been fabricated incorporating the commercial PHE manufactured by Alfa Laval India Limited (model M3 FG). The experimental apparatus consists of cold fluids (nanofluids) and hot fluids (distilled water) flow loops. The hot water flow loops incorporated an insulated hot water tank in conjunction with immersion heaters. The required inlet hot water temperature was achieved by temperature controller. The flow rate was controlled by rotameter. For measuring the pressure difference between entrance and exit ports of PHE for hot distilled water and aforementioned nanofluids the differential pressure manometers were employed. The variations of flow rates range from (1-4) lpm for nanofluids and hot distilled water both. The range of inlet temperature was from 25° C to 30° C for cold fluid keeping inlet temperature of hot distilled water constant (i.e. 70° C) throughout experiment.

The experimental results showed that the convective heat transfer coefficient ratio varied from 1.14 to 1.36 for aforementioned nanofluids at particular coolant flow rate for its respective optimum volumetric fraction. The predicted value of optimum volume concentrations by the authors was 0.75%, 1.0%, 0.75% and 1.25% for CeO_2 -water, Al_2O_3 -water, TiO_2 -water and SiO_2 -water nanofluids respectively. The maximum augmentation observed was about 35.9%, 26.3%, 24.1% and 13.9% respectively at optimum volume concentration, the cold fluid flow rate and hot distilled water flow rate was 3 lpm for both fluid streams. The experimental results illustrated in the Fig: 1.

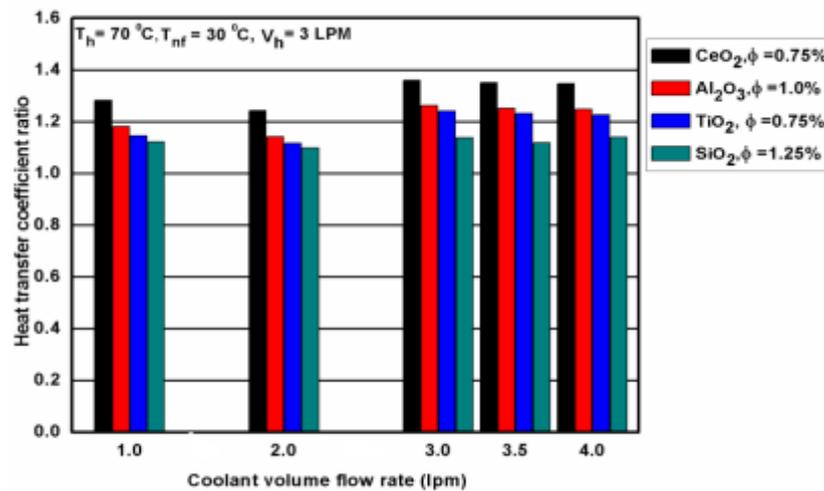


Fig.1 Heat Transfer coefficient of different nanofluids at optimum volume concentration in PHE (Tiwari et al. [8]).

Further the authors were also outlined the pressure drop ratio of above mentioned nanofluids at different volume rate with their optimum volume concentration. It was observed that the pressure plunged sharply as the rate of volume flow of coolant increased. The pressure drop ratio was highest for SiO_2 -water nanofluid and lowest with TiO_2 -water nanofluid as shown in fig: 2.

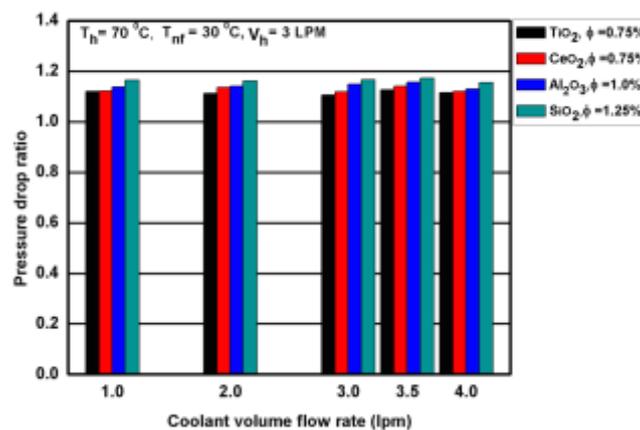


Fig. 2. Pressure Drop Ratio of different nanofluids at optimum volume concentration (Tiwari et al. [8]).

Also Tiwari et al. [9] conducted an experiment for the analysis of the heat transfer characteristics of different nanofluids in corrugated PHE. They employed CeO_2 -water nanofluids ranging from 0-3.0% volume concentrations. The experimental apparatus of this study was similar to described by Tiwari et al. [8]. The plates have the corrugation angle of 30° with 0.5 mm plate thickness. The water was employed as a hot fluid stream and water or the nanofluids as a coolant in the PHE. The aim of present study was to compare with their performance with water. The cold water/nanofluid was stored in a tank with capacity 25 litre. The inlet temperatures were 30°C and 70°C for cold and hot water respectively and were recirculated with the help of centrifugal pump. The volume flow rate was controlled by float-type rotameter.

The results showed that the maximum total heat transfer coefficient occurred at 0.75% volume concentration (optimum) and this augmentation was approximately 28% at 3 lpm volume flow rate of coolant. The overall (total) heat transfer coefficient decreases beyond optimum concentration. The augmentation of overall heat transfer coefficient were found about 18.2%, 27.9%, 22.0%, 20.3%, 18.9%, 17.2% and 13.0% for 0.5, 0.75, 1.0, 1.25, 1.5, 2.0 and 3.0 vol. % respectively as shown in fig 3.

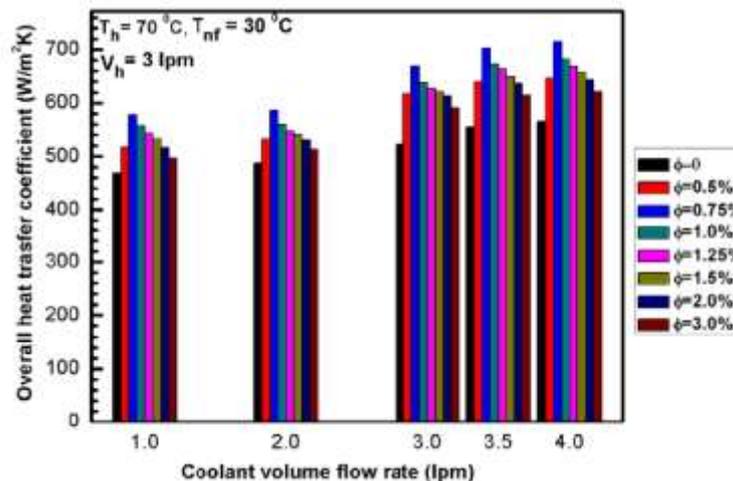


Fig. 3. Overall heat transfer coefficient of CeO_2 /water nanofluid with rate of flow of coolant (Tiwari et al. [9]).

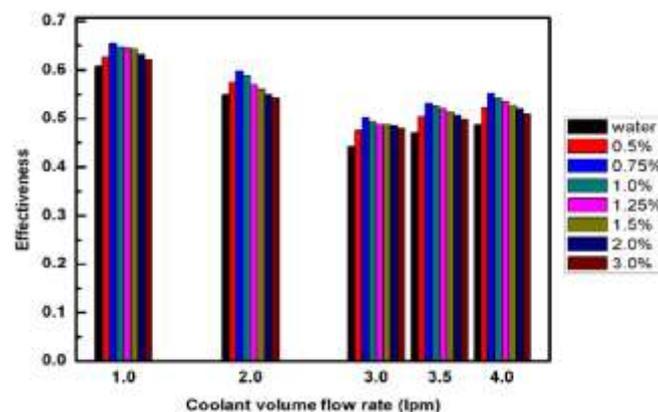


Fig. 4. Variation of effectiveness of CeO_2 /water nanofluid with coolant volume flow rate (Tiwari et al. [9]).

Moreover, the authors had also outlined the variation of effectiveness of $\text{CeO}_2/\text{water}$ nanofluid with different volumetric flow rate of the coolant. The outcomes showed that the effectiveness of the nanofluid strongly depends upon the overall heat transfer coefficient and the value of the effectiveness increases up to 0.75 volume concentration i.e. upto optimum value as shown in fig. 4.

Pantzali et al.[10] studied the effects of nanofluid (CuO -water, 4% v/v) on the performance of a miniature plate heat exchanger with modulated surface experimentally. The authors ascertained that the augmentation of overall heat transfer coefficient was highest at lower coolant volume flow rate for a particular volume flow rate of hot water, as depicted in fig.5.

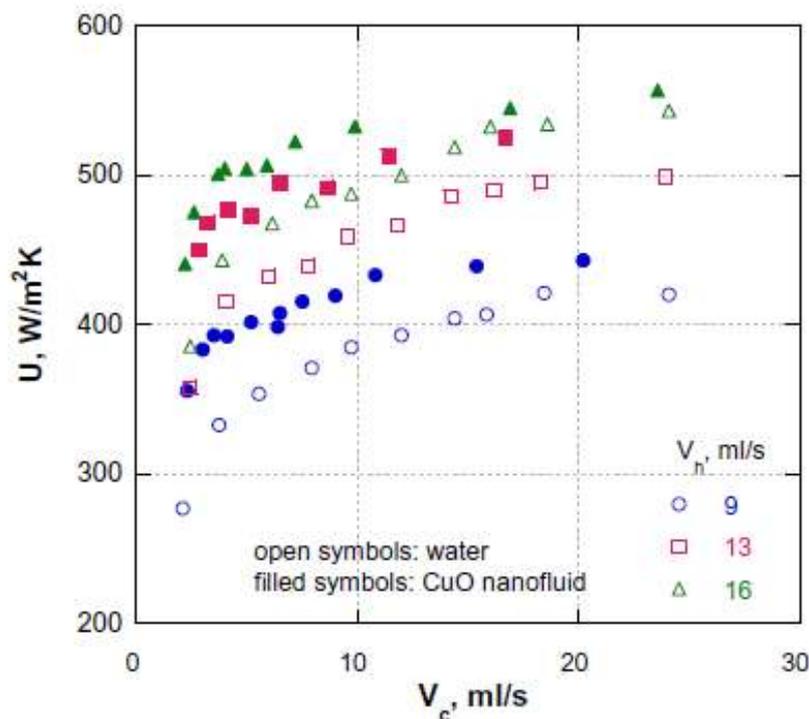


Fig.5. Total heat transfer coefficient of CuO -water nanofluid with volume flow rate of coolant for different hot water flow rates (Pantzali et al. [10]).

Khairul et al. [11] studied the effects of water and CuO/water nanofluids as coolants on heat transfer coefficient, heat transfer rate, frictional loss, pressure drop, pumping power and exergy loss in the corrugated plate heat exchanger. They had focused on the heat transfer analysis by using CuO/water nanofluids with 0.5%, 1.0% and 1.5% particle volume concentration and compared with water. In their analysis, it was assumed that the flow of nanofluids through the PHE are fully developed both thermally and hydrodynamically. However, it was also assumed that the flow of nanofluids through the plates were incompressible and turbulent flow regime. The thermophysical properties of nanofluids were measured at 300 K constant temperatures. The experimental set up of their work was depicted in Fig.13. The volume flow rate of hot fluid was measured as 2 L/min.

The outcomes of their analysis revealed that, the enhancement in heat transfer coefficient were about 17.70%, 21.80% and 24.7% for 0.5%, 1.0% and 1.5 vol. % of CuO/water nanofluids respectively with compare to water. The results showed a significant heat transfer rate for nanofluids. In the present study it was also remarked that the increment of particle volume fraction and volume flow rate of nanofluids could enhance the friction factor

that should result in an increased pressure drop and pumping power. The analytical results showed a reduction in exergy loss by 24%, 16.25% and 8% for 1.5 vol. %, 1.0 vol. % and 0.5 vol. % of CuO/water nanofluids respectively compare to water also. The average value of enhanced effectiveness was found as 34%, 22% and 12% for 1.5 vol. %, 1.0 vol. % and 0.5 vol. % of nanoparticles in contrast with water.

An investigation on heat transfer performances of Al_2O_3 -water nanofluid as coolants in a counter flow corrugated PHE have been done experimentally by Pandey and Nema [12]. Their methodology included the preparation of Al_2O_3 /water nanofluids of required fractions i.e., 2.0, 3.0, and 4.0 vol. % and measurements of thermophysical properties of aforementioned nanofluid.

The results showed that the heat transfer performances improved with decrease in the concentrations of nanofluid and increase in Reynolds and Peclet-number. At a given coolant flow rate, the heat transfer rates and convective heat transfer coefficient enhancement were maximum for 2 vol. % Al_2O_3 / water nanofluid. However, the authors reported that the use of aforementioned nanofluid more than 2% volume fraction should be avoided because it will not be economical and will result in more pressure drop, owing to their higher viscosity, without any considerable benefit in heat transfer performance. For a given coolant, the friction factor decreased with increase in Peclet number. Moreover, among the four coolants (i.e.0%,2%,3% & 4% vol.), the non-dimensional exergy loss was minimum with 2% nanofluid for a coolant flow rate of up to 3.7 lpm, beyond that water gave the least value as depicted in Fig.7.

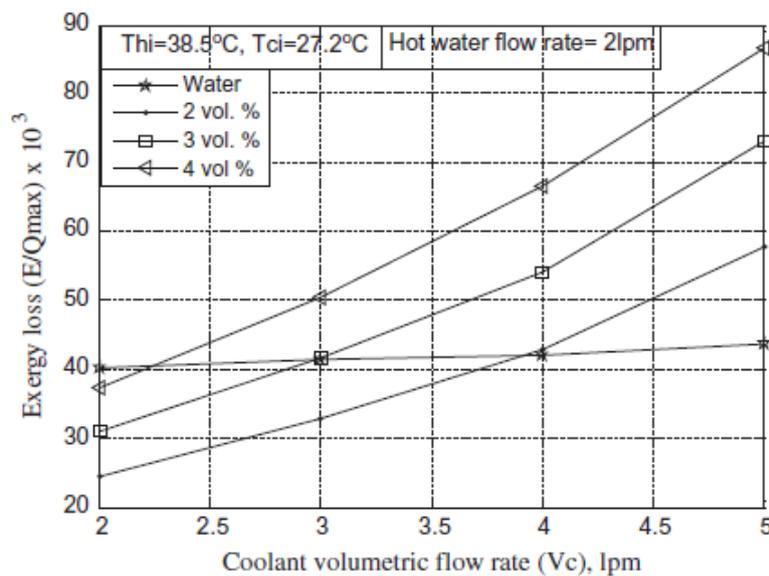


Fig.7. variation of non-dimensional exergy loss v/s coolant volumetric flow rate (Pandey and Nema [12]).

K. Anoop et al. [13] studied, heat transfer performances of nanofluids in industrial type PHE experimentally. Their experimental procedures were in two steps. In the first step, SiO_2 /water nanofluid was prepared of desired concentration (2%, 4%, and 6% by weight) for the experimentation. In the next step, two flow loops (i.e. hot flow loop and cold flow loop) were design to run in a counter flow configuration through an industrial-type PHE to analyse heat transfer characteristics of the aforementioned nanofluid. The experimental set up incorporated

both, plate heat exchanger and shell-and-tube heat exchanger. But, the apparatus was designed in such a way that experiments might be done in either PHE or shell-and-tube heat exchanger by switching the control valves. Their experimental set up composed of two flow loop i.e. hot flow loop and the cold flow loop. The hot water was stored in a large heating tank controlled by proportional-integral-derivative (PID) in hot flow loop while water or desired concentrations of SiO_2 nanofluids stored in a small tank in cold flow loop. In their experimentation, the cold fluid along with chilled water was being pumped through a heat exchanger in counter flow manner first and further it supplied to the PHE for conducting the experiment and then pumped back to cold tank again. The chilled water was stored in an industrial chillier with capacity of 11-ton to maintain a steady low temperature of the fluid. K-type thermocouples were employed for measuring the temperatures and that were placed at the entrance and exit of the heat exchanger in hot and cold loops. Pressure transducers, placed at the inlet and outlet of the cold loop, were employed to measure the pressure drop across the PHE. Coriolis flow meters were used to measure mass flow rates in hot and cold loops both.

The results revealed that addition of nanoparticles had a significant influence on the total heat transfer coefficient. However, the effect was insignificant at lower fraction of 2.0 and 4.0 wt%. Lower particle concentrations showed better heat transfer enhancement than higher concentrations at lower mass flow rates as depicted in Fig.8. The inset figure showed the cross-sectional view of the PHE. Moreover, the Maximum enhancement of approximately 5% in overall heat transfer coefficient was experienced for 2.0 wt% at the lowest mass flow rate in the present experiment.

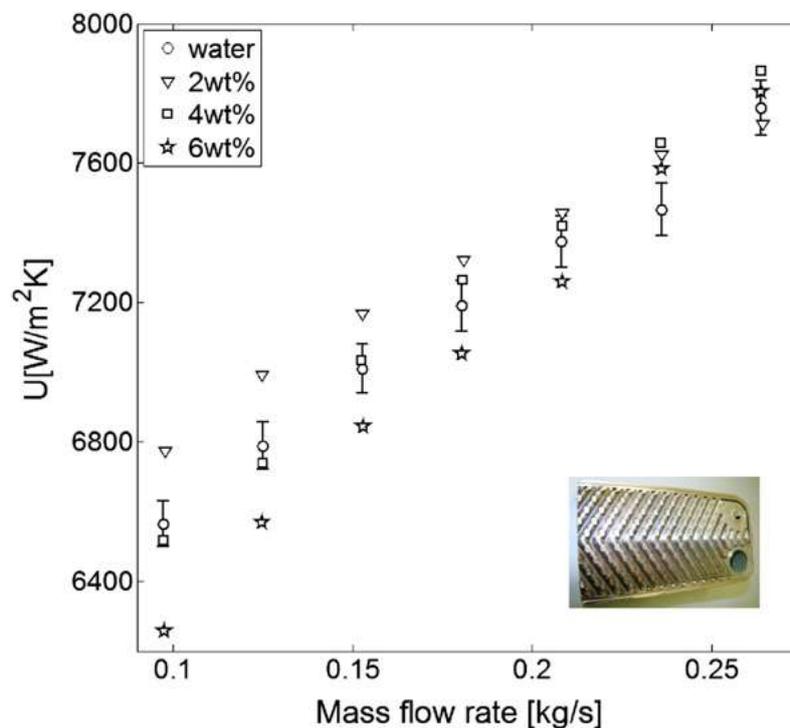


Fig.8. variation of total heat transfer coefficient of SiO_2 -water nanofluid in a PHE (K. Anoop et al. [13]).

III CONCLUSION

The applications of the nanofluids in plate heat exchanger experimentally reviewed here exclusively. The review reveals that the nanofluid shows the outstanding performance in terms of heat transfer characteristics and pressure drop improvement in plate heat exchanger. The heat transfer coefficients increased with increasing the nanoparticle volume fractions owing to the improvement in thermophysical properties. However, the heat transfer performances improved with decrease in the concentrations of nanofluid and increase in Reynolds and Peclet-number conferred by some experimental investigations which reveals the noteworthy chaos.

The effectiveness of the nanofluids depends upon not only the thermophysical properties but also depend on flow behaviour (i.e. laminar or turbulent) in some experimental studies. However, the effectiveness decreased with increasing the Reynolds number reported by research group.

Thus it is concluded that more attention is needed towards the heat transfer characteristics of nanofluids and uniformity of their results.

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OBJECT TRACKING IN COMPUTER VISION SURVEY

PAPER

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ABSTRACT

Image processing is the process of manipulating image data in order to make it suitable for computer vision applications or to make it suitable to present it to humans. Computer system vision which goes beyond image processing helps to obtain relevant information from images and make decisions based on that information. The increasing availability of video sensors and high performance video processing hardware opens up exciting possibilities for tackling many video understanding problems. Vital to many video understanding problems are target classification and tracking. Real time object tracking is the difficult task in many computer vision applications such as surveillance, perceptual user interfaces, smart rooms, augmented reality, object-based video compression, and driver assistance. Tracking can be defined as the problem of estimating the trajectory of an object in the image plane as it moves around a scene. Real-time tracking of non-rigid objects seen from a moving camera based on the mean shift iterations and finds the most probable target position in the current frame. Tracking of non-rigid objects based on visual features such as color and texture, whose statistical distributions characterize the object of interest, a very efficient visual object tracking algorithm based on the particle filter it characterizes the tracked objects using color and edge orientation histogram features tracking algorithm maintains multiple hypotheses and offers robustness against clutter or short period occlusions. In our survey we use method which efficiently detect and track object and perform with presents of noise and occlusion in video.

Keywords: Frame Difference, Object Detection, Occlusion Handling and Tracking.

I INTRODUCTION

Tracking Object tracking is the most popular area of research in 21st century, in past we use old traditional way of tracking object from analyzing sequence of images from humans information coordination but today's digital age use digital data processing technologies for object tracking. Now we use video processing for object tracking. To perform object tracking by video processing we need to deal with three key issues of video analysis, identify interesting moving objects, tracking of such objects from each and every frame of video sequence, and analysis of object path. Here we use models for analyzing video frame sequence, some of the existing models for object tracking are contour-based models, region-based models and feature point-based models. There are some basic methods for target tracking in real-time

video applications most common methods are temporal differencing and template correlation matching. In the earlier approach, video frames separated by a constant time t , are compared to find regions which have changed. In the later approach each video image is scanned for the region which best correlates to an image template. Tracking objects is not that simple like its look because of its complexity due to loss of information caused by projection of the 3D world on a 2D image, noise in images, rigid or articulated nature of objects, complex object shapes and complex object motion, scene illumination changes and real-time processing requirements these are some most common reasons. Our project is focused on methodologies for tracking objects that need to be addressed when build an object tracker. The first issue how to defining a suitable representation of the object? The next issue is which image feature is select as an input for the tracker and general strategies for detecting the objects in a frame.

Tracking objects can be Complex due to:

- loss of information caused by projection of the 3D world on a 2D image,
- noise in images,
- complex object motion,
- non rigid or articulated nature of objects,
- partial and full object occlusions,
- complex object shapes,
- scene illumination changes, and
- Real-time processing requirements.

Our survey is focused on methodologies for tracking objects in general we are describing the issues that need to be addressed when one sets out to build an object tracker. The first issue is defining a suitable representation of the object. The next issue is the selection of image features used as an input for the tracker, and general strategies for detecting the objects in a scene, the appropriateness of a particular tracking algorithm depends on object appearances, object shapes, number of objects, and illumination conditions [1].

II OBJECT REPRESENTATION

In tracking, an object can be defined as anything that is of importance for further analysis. For instance, boats on the sea, vehicles on a road, planes in the air, people walking on a road, are a set of objects that may be important to track in a particular domain. Objects can be represented by their shapes and appearances.

$$\text{Object representation} = \text{Shape} + \text{Appearance}$$

Figure 1. Object representation.

There are various representations of object shape, which is commonly used for tracking and appearance representations in [1] describing as follows.

2.1 Points

The object is represented by a point, that is, the centroid (Figure 2(a)) or by a set of points (Figure 2(b)). In general, the point representation is suitable for tracking objects that occupy small regions in an image.

2.2 Primitive geometric shapes

Object shape is represented by a rectangle, ellipse (Figure 2(c), (d)). Object motion for such representations is usually modeled by translation, affine, or projective transformation. Primitive geometric shapes are more suitable for representing simple rigid objects they are also used for tracking non rigid objects.

2.3 Object silhouette and contour.

Contour representation defines the boundary of an object (Figure 2(g), (h)). The region inside the contour is called the silhouette of the object (see Figure 2(i)). Silhouette and contour representations are suitable for tracking complex non rigid shapes.

2.4 Articulated shape models.

Articulated objects are composed of body parts that are held together with joints. For example, the human body is an articulated object with torso, legs, hands, head, and feet connected by joints. The relationship between the parts is governed by kinematic motion models, for example, joint angle, etc. In order to represent an articulated object, one can model the constituent parts using cylinders or ellipses as shown in Figure 1(e).

2.5 Skeletal models.

Object skeleton can be extracted by applying medial axis transform to the object silhouette. This model is commonly used as a shape representation for recognizing objects representation can be used to model both articulated and rigid objects (see Figure 1(f)).

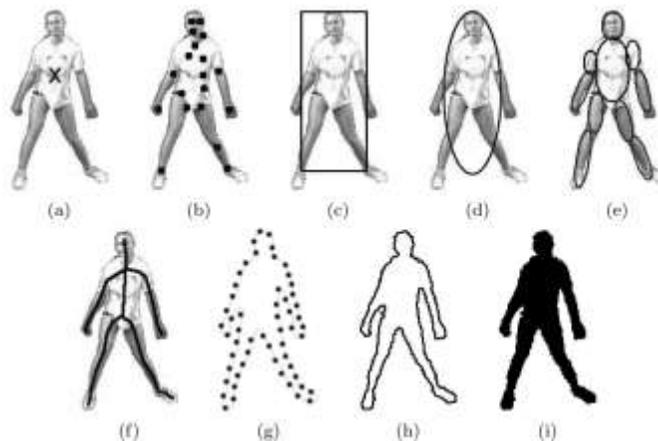


Figure 2. Object Shape Representations.

III FEATURE SELECTION FOR TRACKING

Feature selection is closely related to the object representation many tracking algorithms use a combination of these features. The details of common visual features are as follows [1]:

3.1. Color.

Color of an object is subjective by two factors. They are Spectral power distribution of the illuminant and Surface reflectance properties of the object. Different color models are RGB, L^*u^*v and L^*a^*b used to represent color.

3.2. Edges.

Edge detection is used to identify strong changes in image intensities generated by object boundary. Edges are less sensitive to illumination changes compared to color features. Most popular edge detection approach is Canny Edge detector.

3.3. Optical Flow

It is a dense field of displacement vector which defines the translation of each pixel in a region. It is computed using the brightness constraint, which assumes brightness constancy of corresponding pixels in consecutive frames. Optical Flow is commonly used as a feature in motion based segmentation and tracking application [2].

3.4. Texture

Texture is a measure of the intensity variation of a surface which quantifies properties such as smoothness and regularity. It requires a processing step to generate the descriptors. There are various texture descriptors Gray-Level Co-occurrence Matrices, loss texture measures, wavelets, and steerable pyramids [3].

IV OBJECT DETECTION

Every tracking method requires an object detection mechanism either in every frame or when the object first appears in the video. A common approach for object detection is to use information in a single frame. However, some object detection methods make use of the temporal information computed from a sequence of frames to reduce the number of false detections. For object detection, there is several common object detection methods described as follows:

4.1. Point detectors.

Point detectors are used to find interesting points in images which have an expressive texture in their respective localities. A desirable quality of an interest point is its invariance to changes in illumination and camera viewpoint. In literature, commonly used interest point detectors include Moravec's detector, Harris detector, KLT detector, SIFT detector [4].

4.2. Background Subtraction.

Object detection can be achieved by building a representation of the scene called the background model and then finding deviations from the model for each incoming frame. Any significant change in an image region from the background model signifies a moving object. The pixels constituting the regions undergoing change are marked for further processing. This process is referred to as the background subtraction. There are various methods of background subtraction as discussed in the survey [1] are Frame differencing Region-based (or) spatial information, Hidden Markov models (HMM) and Eigen space decomposition [5].

4.3. Segmentation.

The aim of image segmentation algorithms is to partition the image into perceptually similar regions. Every segmentation algorithm addresses two problems, the criteria for a good partition and the method for achieving efficient partitioning. They are, mean shift clustering [6], and image segmentation using Graph-Cuts [7] (Normalized cuts) and Active contours [8].

V OBJECT TRACKING

The meaning of an object tracker is that it finds out the motion path of an object as video frames progresses along with time by identify the object position in every frame of the video. The complete region that is occupied by the object in the image at every time instant can also be found out by the object tracker. The detected objects in frames are being tracked in the successive frames. The object detection task and object connection establishment task between the instances of the object across frames can be done separately or jointly. In the first situation, with the help of object detection algorithm possible object regions in every frame are obtained, and objects correspondence across frames is performed by object tracker. In the second situation, information obtained from previous frames helps in finding the object region and correct estimation of connection is done jointly by iterative updating of object region and its location information obtained from previous frames [1]. There are different methods of Tracking.

5.1. Point tracking.

Objects detected in consecutive frames are represented by points, and the association of the points is based on the previous object state which can include object position and motion. Tracking can be formulated as the correspondence of detecting objects represented by points across frames. Point tracking can be divided into two broad categories, i.e. Deterministic approach and Statistical approach. The deterministic methods use qualitative motion heuristics to constrain the correspondence problem. On the other hand, probabilistic methods explicitly take the object measurement and take uncertainties into account to establish correspondence.

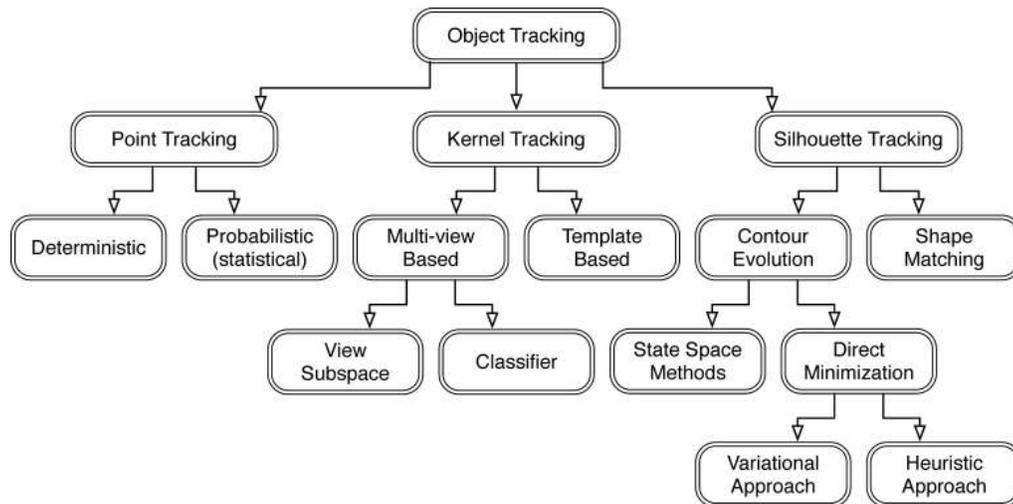


Figure 3. Classification of Tracking Methods.

5.2 Kernel tracking.

Performed by computing the motion of the object, that is represented by a primitive object region from one frame to the next. Object motion is in the form of parametric motion or the dense flow field computed in subsequent frames. Kernel tracking methods are divided into two subcategories based on the appearance representation used i.e. Template and Density-based Appearance Model and Multi-view appearance model.

5.3 Silhouette Tracking.

It provides an accurate shape description of the target objects. The goal of silhouette tracker is to find the object region in each frame by means of an object model generated using the previous frames. Silhouette trackers can be divided into two categories i.e. Shape matching and Contour tracking

VI LITERATURE SURVEY

6.1. Contour based object tracking.

Xu and Ahuja [9] proposed a contour based object tracking algorithm to track object contours in video sequences. In their algorithm, they segmented the active contour using the graph-cut image segmentation method. The resulting contour of the previous frame is taken as initialization in each frame. New object contour is found out with the help of intensity information of current frame and difference of current frame and the previous frame [14]. Dokladal et al.[10] the proposed approach is active contour based object tracking. For the driver's-face tracking problem they used the combination of feature-weighted gradient and contours of the object. In the segmentation step they computed the gradient of an image. They proposed a gradient-based attraction field for object tracking. Ling et al.[16] given an object tracking approach based on contours. The object rough location is found though multi-feature fusion strategy. For

accurate and robust object contour tracking, they have extracted the contours with the help of region-based object contour extraction.

6.2. Feature based object tracking.

Li et al. [11] proposed a corner feature based object tracking method using Adaptive Kalman Filter. To represent moving object corner feature are firstly used. Then, the number of corner point variation across consecutive frames to is used to automatically adjust the estimate parameters of Kalman Filter, Xue et al. [12] uses the discriminative features which are chosen by object/background separation, using a voting strategy. With the help of discriminative features they presented an improved mean-shift algorithm for object tracking, Biresaw et al. [13] developed a feature point tracker. To improve the performance of the tracker they have used time reversed back tracking evaluation criteria together with Partial Least Square regression. Alvarez and Regazzoni [15] extended their feature based method of object tracking by using sparse shape points. The possible data association events are sampled with the particle filter to Also, the particle filter helps in estimating the global position and object velocity. Miao et al. [17] proposed a new robust feature-based tracking method via online boosting by applying adaptive classifiers to match the detected key points in consecutive frames. The proposed approach shows that by integrating the robust local feature and the adaptive online boosting algorithm can help cater to changes between successive frames. Fan et al.[18] presented a robust object tracking for processing images on mobile devices in real-time. They employ a holistic haar-like feature matching method to track objects of interests.

6.3. Region based object tracking.

Xu et al.[20] presented a new method for supervised object segmentation in video sequence. In the proposed method the user input object outline is considered as video object. In moving object tracking, the model incorporated the object's region segmentation and the motion estimation. Active contour model is also employed for contour fine-tuning. Andrade et al.[22] introduced a novel technique with the help of region derived descriptors for segmentation and tracking. The homogeneous regions of an image are obtained by partitioning the image into a series. Thus, the problem of object extraction changes from pixel based to database analysis. Wei et al.[21] proposed an object extraction scheme mainly consists of two trackers. Using Adaboost-based global color feature selection the pixel-wise tracker extracts an object. To regionalize each frame K-means clustering is performed by the region-wise tracker at the beginning.

VII CONCLUSION

In this survey of object tracking we present approaches for tracking and also give a brief review of related topics. We divide the tracking approaches into three categories first is object representation techniques, feature selected for object identification in successive image frames, and last one is object detection methods and algorithms. We believe that, this survey on object tracking with a rich content can give valuable insight into this important research topic and encourage new research.

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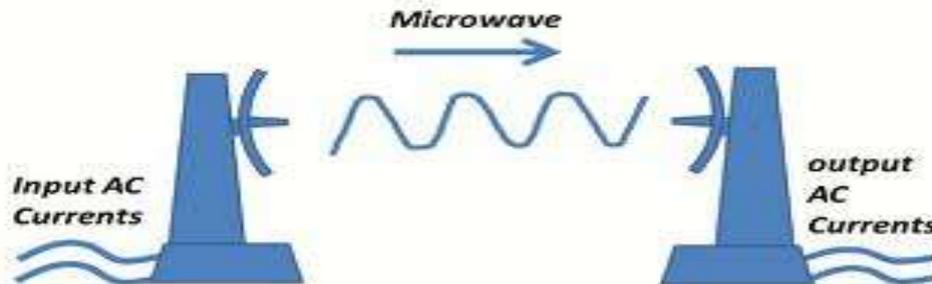
WITRICITY: 'WI'reless elec'TRICITY'

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ABSTRACT

In this paper, we present the concept of transmitting power without using wires i.e., transmitting power as microwaves from one place to another in order to reduce the transmission and distribution losses. Imagine a future in which wireless power transfer is feasible: cell phones, household robots, mp3 players, laptop computers and other portable electronics capable of charging themselves without ever being plugged in, freeing us from that final, ubiquitous power wire. Some of these devices might not even need their bulky batteries to operate. This paper includes the techniques of transmitting power without using wires with an efficiency of about 95% with non-radiative methods. Due to which it does not affect the environment surrounding. This technique includes transfer of power through microwaves using rectenna. This is particularly suitable for long range distances ranging kilometres. With this we can avoid the confusion and danger of having long, hazardous and tangled wiring. This paper as a whole gives an effective, high performance techniques which can efficiently transmit the power to the required area.



Key Words : Nikola Tesla, Microwave Power transmission (MPT), Rectenna, Solar Power Satellites (SPS).

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2. History
3. Need For Wireless Transmission
4. Wireless Power Transmission(Wpt)
5. Types Of Wireless Power Transmission
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7. Applications
8. Advantages, Disadvantages, And Biological Impacts Of Wpt
9. Biological Impacts
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I INTRODUCTION

One of the major issue in power system is the losses occurs during the transmission and distribution of electrical power. As the demand increases day by day, the power generation increases and the power loss is also increased. The major amount of power loss occurs during transmission and distribution. The percentage of loss of power during transmission and distribution is approximated as 26%. The main reason for power loss during transmission and distribution is the resistance of wires used for grid. The efficiency of power transmission can be improved to certain level by using high strength composite over head conductors and underground cables that use high temperature super conductor. But, the transmission is still inefficient. According to the World Resources Institute (WRI), India's electricity grid has the highest transmission and distribution losses in the world – a whopping 27%. Numbers published by various Indian government agencies put that number at 30%, 40% and greater than 40%. This is attributed to technical losses (grid's inefficiencies) and theft. Any problem can be solved by state-of-the-art technology. The above discussed problem can be solved by choose an alternative option for power transmission which could provide much higher efficiency, low transmission cost and avoid power theft. Microwave Power Transmission is one of the promising technologies and may be the righteous alternative for efficient power transmission.

II HISTORY

Nikola Tesla he is who invented radio and shown us he is indeed the "Father of Wireless". Nikola Tesla is the one who first conceived the idea Wireless Power Transmission and demonstrated "the transmission of electrical energy without wires" that depends upon electrical conductivity as early as 1891. In 1893, Tesla demonstrated the illumination of vacuum bulbs without using wires for power transmission at the World Columbian Exposition in Chicago. The Wardencllyffe tower was designed and constructed by Tesla mainly for wireless transmission of electrical power rather than telegraphy. The 187-foot Wardencllyffe Tower (Tesla Tower) in 1904, an airship ship motor of 0.1 horsepower is driven by transmitting power through space from a distance of least 100 feet.

In 1961, Brown published the first paper proposing microwave energy for power transmission, and in 1964 he demonstrated a microwave-powered model helicopter that received all the power needed for flight from a microwave beam at 2.45 GHz from the range of 2.4GHz – 2.5 GHz frequency band which is reserved for Industrial, Scientific, and Medical (ISM) applications. Experiments in power transmission without wires in the range of tens of kilowatts have been performed at Goldstone in California in 1975 and at Grand Bassin on Reunion Island in 1997 . The world's first MPT experiment in the ionosphere called the MINIX (Microwave Ionosphere Non-linear Interaction Experiment) rocket experiment is demonstrated in 1983 at Japan . Similarly, the world's first fuel free airplane powered by microwave energy from ground was reported in 1987 at Canada. This system is called SHARP (Stationary High – Altitude Relay Platform) .In 2003, Dryden Flight Research Centre of NASA demonstrated a laser powered model airplane indoors. Japan proposed wireless charging of electric motor vehicles by Microwave Power Transmission in 2004. Powercast, a new company introduced wireless power transfer technology using RF energy at the 2007 Consumer Electronics Show . A physics research group, led by Prof. Marin Soljagic, at the Massachusetts Institute of technology (MIT) demonstrated wireless powering of a 60W light bulb with 40% efficiency at a 2m (7ft) distance using two 60cm-diameter coils

in 2007 . Recently in 2008, Intel reproduced the MIT group's experiment by wirelessly powering a light bulb with 75% efficiency at a shorter distance.

III NEED FOR WIRELESS TRANSMISSION

Wireless transmission is employed in cases where instantaneous or continuous energy transfer is needed, but interconnecting wires are inconvenient, hazardous, or impossible.



IV WIRELESS POWER TRANSMISSION

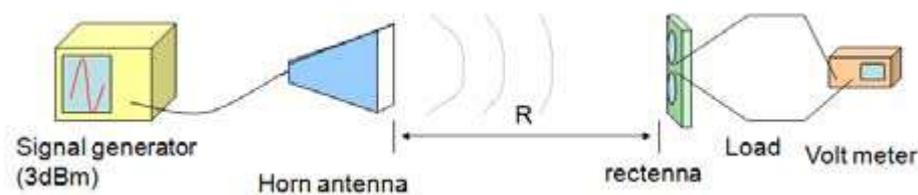
William C. Brown, the pioneer in wireless power transmission technology, has designed, developed a unit and demonstrated to show how power can be transferred through free space by microwaves. The concept of Wireless Power Transmission System is explained with functional block diagram. In the transmission side, the microwave power source generates microwave power and the output power is controlled by electronic control circuits. The wave guide ferrite circulator which protects the microwave source from reflected power is connected with the microwave power source through the Coax – Waveguide Adaptor. The tuner matches the impedance between the transmitting antenna and the microwave source. The attenuated signals will be then separated based on the direction of signal propagation by Directional Coupler. The transmitting antenna radiates the power uniformly through free space to the rectenna. In the receiving side, a rectenna receives the transmitted power and converts the microwave power into DC power. The impedance matching circuit and filter is provided to setting the output impedance of a signal source equal to the rectifying circuit. The rectifying circuit consists of Schottky barrier diodes converts the received microwave power into DC power.

V TYPES OF WIRELESS POWER TRANSMISSION

There are two types of wireless power transmission

- 1) Near Field Technique
- 2) Far Field Technique

“Microwave power transmission comes under far field technique”



VI COMPONENTS OF WPT SYSTEM

The Primary components of Wireless Power Transmission are Microwave Generator, Transmitting antenna and Receiving antenna (Rectenna). The components are described below:

➤ Microwave Generator

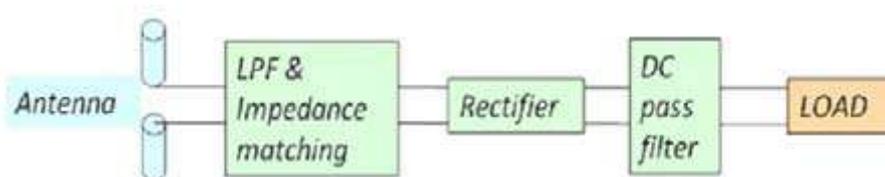
The microwave transmitting devices are classified as Microwave Vacuum Tubes (magnetron, klystron, Travelling Wave Tube (TWT), and Microwave Power Module (MPM)) and Semiconductor Microwave transmitters (GaAs MESFET, GaN pHEMT, SiC MESFET, AlGaIn/GaN HFET, and InGaAs). Magnetron is widely used for experimentation of WPT. The microwave transmission often uses 2.45GHz or 5.8GHz of ISM band. The other choices of frequencies are 8.5 GHz , 10 GHz and 35 GHz . The highest efficiency over 90% is achieved at 2.45 GHz among all the frequencies.

➤ Transmitting Antenna

The slotted wave guide antenna, micro strip patch antenna, and parabolic dish antenna are the most popular type of transmitting antenna. The slotted waveguide antenna is ideal for power transmission because of its high aperture efficiency (> 95%) and high power handling capability.

➤ Rectenna

The concept, the name 'rectenna' and the rectenna was conceived by W.C. Brown of Raytheon Company in the early of 1960s. The rectenna is a passive element consists of antenna, rectifying circuit with a low pass filter between the antenna and rectifying diode. The antenna used in rectenna may be dipole, parabolic dish antenna. The patch dipole antenna achieved the highest efficiency among the all. Schottky barrier diodes (GaAsW, Si, and GaAs) are usually used in the rectifying circuit due to the faster reverse recovery time and much lower forward voltage drop and good RF characteristics.



VII APPLICATIONS

Wireless power transmission would have many interesting applications. Some of the applications involve simply powering devices or vehicles from a remote power source. However, the energy grid could be affected as well. If long distance, high efficiency wireless power transmission is possible, we could reduce our reliance on transmission lines to transfer energy over long distances. Moreover, wireless power transfer could allow an

alternative source of clean energy by transmitting solar power from space back down to places where it is needed on earth. One of the major application is-

7.1 Solar Power Satellites

If an efficient method of wireless power transmission is developed, one possible application would be a solar power satellite as shown in Figure. This idea consists of having a satellite with solar panels orbiting the earth. The satellite generates electrical energy using its solar cells. This energy is converted into an electromagnetic wave and transmitted wirelessly to receivers on the earth. The receivers then convert the transmitted energy back into usable electrical power. To demonstrate technical feasibility, researchers would first like to transmit kilowatts of power from a satellite in low-earth orbit. Additionally, target 80% conversion efficiency is desired within both the transmitter and the receiver. Since the satellite orbits above the atmosphere, it would consistently collecting solar energy, as opposed to photovoltaic systems on earth which may be obstructed by weather conditions. Also, a single satellite could potentially provide power to many locations around the world by having multiple wireless power receivers linked to the satellite. Thus, the development of solar power satellites could consistently provide clean energy around the world.



VIII ADVANTAGES, DISADVANTAGES, AND BIOLOGICAL IMPACTS OF WPT

8.1 Advantages

Wireless Power Transmission system would completely eliminates the existing high-tension power transmission line cables, towers and sub stations between the generating station and consumers and facilitates the interconnection of electrical generation plants on a global scale. It has more freedom of choice of both receiver and transmitters. Even mobile transmitters and receivers can be chosen for the WPT system. The cost of transmission and distribution become less and the cost of electrical energy for the consumer also would be reduced. The power could be transmitted to the places where the wired transmission is not possible. Loss of transmission is negligible level in the Wireless Power Transmission; therefore, the efficiency of this method is very much higher than the wired transmission. Power is available at the rectenna as long as the WPT is

operating. The power failure due to short circuit and fault on cables would never exist in the transmission and power theft would be not possible at all.

8.2 Disadvantages

The Capital Cost for practical implementation of WPT seems to be very high and the other disadvantage of the concept is interference of microwave with present communication systems.

IX BIOLOGICAL IMPACTS

Common beliefs fear the effect of microwave radiation. But the studies in this domain repeatedly proves that the microwave radiation level would be never higher than the dose received while opening the microwave oven door, meaning it is slightly higher than the emissions created by cellular telephones. Cellular telephones operate with power densities at or below the ANSI/IEEE exposure standards. Thus public exposure to WPT fields would also be below existing safety guidelines.

X CONCLUSION

Wireless electricity is not just great idea but an urgent measure that has to be taken to deal with the current energy crisis. Even the smallest entity can lead to one of the most mindboggling dilemmas of the world. Electrons the source of electricity puts us in a similar fix. It is on us to decide how to tap these electrons to be useful in our lives.

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CONCENTRATION DEPENDENT DIFFUSION OF IMPURITIES INTO SILICON

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ABSTRACT

In the case of diffusion of boron into silicon, the sheet resistance values observed in narrow diffusion windows differ significantly from the values obtained on plain un-masked check slices with the former always being greater than the latter. The actual value of this discrepancy depends upon several factors such as the size of the window, the surrounding masking oxide geometry and the process parameters. These observations add another important factor in 2-D simulation for diffusion processes. An attempt has been made to present a theoretical model to explain the experimental observations. The results of few experiments with oxide masking have been presented. On the basis of these experiments it is suggested that most of the experimental observations may be explained with the help of a theoretical model based on surface diffusion of boron over silicon and silicon dioxide. The model is based upon the phenomenon of surface diffusion over silicon and silicon dioxide with a high solubility of boron in oxide. Numerical calculations demonstrate the capability of the model to explain most of the experimental observations.

Keywords: Boron, Diffusion, Masking, Oxide, Profile

I INTRODUCTION

It has been reported earlier (1) that in the case of diffusion of boron and phosphorous in silicon, the sheet resistance obtained on patterned resistors depends upon the surrounding masking oxide frame width. The results of a more careful investigation have also been reported (2,3). It has been observed that the sheet resistance measured on a large area plain check slice, using the four point probe method (3). The actual value of the discrepancy depends upon the size of the window, the surrounding masking oxide geometry and the process parameters. It has been concluded (2,3) that the effect occurs only with boron and is due to the presence of the masking oxide surrounding the window which is absent in the check slice. It has been shown (3) that the effect occurs at the deposition stage and is independent of background concentration, surface orientation, oxide thickness and oxide growth conditions and decreases with an increase in the total amount of doping per unit surface area. The effect disappears in boron is ion-implanted. The spreading resistance and the infra-red free carrier emission measurements shows (4) that the effect is of long range nature and extends to a distance of several hundred microns from the oxide edge on an open slice.

These observations are important in : (i) the design of resistors in conventional processing and (ii) the process/device modeling since the practical devices are oxide masked but the profiles are measured on large check slices.

Thus it is concluded that the diffusion of boron through patterned silicon is three dimensional in nature and the presence of masking oxide and its geometry plays an important role in the diffusion kinetics. Further investigations have therefore been made in order to develop a satisfactory model for the observed results.

II POSSIBLE EXPLANATION FOR THE OBSERVED DESCREPANCY

2.1 The tendency of boron to deposit over oxide

Due to a greater affinity of boron towards oxide compared to silicon, it may be argued that a disturbance of boron distribution in the gas phase close to the oxide edge may take place. This causes less boron to deposit on silicon near the oxide. However, any such disturbance of boron distribution in the gas phase is very unlikely to stay because of a very large amount of boron present and a very high diffusion rate in the gas phase. Therefore, this explanation is not physically possible.

2.2 The influence of Si-SiO₂ interface

One may argue that some phenomenon associated with the Si-SiO₂ interface may cause the effect. Gibbon et al. (4) have demonstrated enhanced diffusion at the window edge. This would in fact result in higher doping in the window and hence a lower value of ρ_s (res) compared to ρ_s (4 pt). Other possibilities may include the stress caused by the mismatch between the coefficient of thermal expansion of silicon and silicon dioxide (5), the intrinsic stress or precipitation resulting in electrical inactivity of some of the boron atoms. Although none of these possibilities are likely to explain the long range nature of the observed masking oxide effects as seen from the spreading resistance and the free carrier emission measurements (6), some more direct evidence to negate is necessary.

2.3 The surface diffusion over silicon

A more likely explanation based on the surface diffusion of boron over silicon and silicon dioxide is now considered. It is suggested that due to the high solubility of boron in silicon dioxide (7), the concentration of boron over the oxide surface is reduced and the boron ad-atoms (atoms adsorbed at the silicon surface) near the oxide edge move towards it. This results in a concentration gradient of boron ad-atoms over the silicon surface in the window. The surface diffusion of these atoms then takes place under the influence of this concentration gradient, thereby removing some of the boron laterally from the silicon window into the oxide. This reduces the surface concentration at different points in the window, resulting in lesser amount of boron diffused and hence causing a higher value of sheet resistance in the windows. The surface diffusion, seems to be the most plausible mechanism to explain the effects of masking oxide on boron diffusion.

III EXPERIMENTAL RESULTS WITH OXIDE MASKING

Results of few experiments are given below

(i) Resistors were fabricated by etching off silicon in selected areas of a boron doped layer. The measurement of these resistors showed that the sheet resistance values on the resistors and on the plain the regions were equal. These rules out any effect of the presence of masking oxide on electrical measurements or on the mobility of the charge carriers.

(ii) Wafer was annealed in nitrogen before and after opening windows in oxide to relieve stresses or strains, if any. The results were same as before.

(iii) Boron was diffused through a thin uniform layer of poly silicon deposited over the wafer after opening windows in oxide. No effects of masking oxide were seen which indicates that the oxide surface and not the Si-SiO₂ interface is responsible for the influence of oxide on diffusion.

(iv) The effects of masking oxide were found to decrease with increase in total concentration suggesting a limitation to the effect. To confirm this, oxide was carefully doped with boron prior to diffusion through the windows. The effects of masking oxide were found to decrease.

III THE SURFACE DIFFUSION MODEL

On the basis of a careful analysis and consideration of experimental results described earlier, it is concluded that the effects of masking oxide on boron diffusion may be explained with the help of a 'surface diffusion model', described below:

During pre deposition of boron, the atoms arriving at the silicon surface (ad-atoms), are loosely bound. The ad-atoms close to the masking oxide surface are absorbed by the oxide due to high solubility of boron in silicon dioxide, resulting in a depletion of boron near the oxide edge. This causes a concentration gradient across the window. Surface diffusion of ad-atoms of boron then takes place under the influence of this concentration gradient. The amount available at the surface of silicon for diffusion into the bulk is thus reduced causing an increase in the actual sheet resistance values in the windows. The model is quantitatively developed in the following sections.

IV THE QUANTITATIVE MODEL

- (a) The pre deposition system of boron through patterned silicon is shown in Fig. 1. The following simplifying assumptions are made:
- (b) It is assumed that an average value of flux F_n per unit area per unit time of boron atoms arriving at the surface of silicon from the source is constant.
- (c) The surface diffusion takes place, both over the silicon window as well as the surrounding oxide with surface diffusion coefficients of D_s and D_{ox} respectively.
- (d) The boron is dissolved uniformly all over the oxide width up to a maximum concentration of C_l atoms/sq.cm.
- (e) The maximum rate at which boron may be dissolved in oxide is proportional to the difference between C_l and the actual concentration of boron in the oxide, $C_{ox}(t)$, with G as the constant of proportionality. In the beginning of diffusion, the rate of arrival of boron at the oxide is smaller

than the above and hence all the boron is dissolved in the oxide. Thus the boron surface concentration at the oxide surface continues to remain zero until the maximum dissolution rate of boron becomes less than the rate of its arrival.

- (f) Because of a much greater solubility of boron in oxide (7) and a higher value of sticking coefficient the rate of boron reflected back from the oxide surface may be much smaller compared to that over silicon. Hence, the effective flux over the oxide is assumed to be a factor H times greater than that over silicon.

Referring to Fig. 1 the equations to be solved are as follows using the well established concepts (8) :

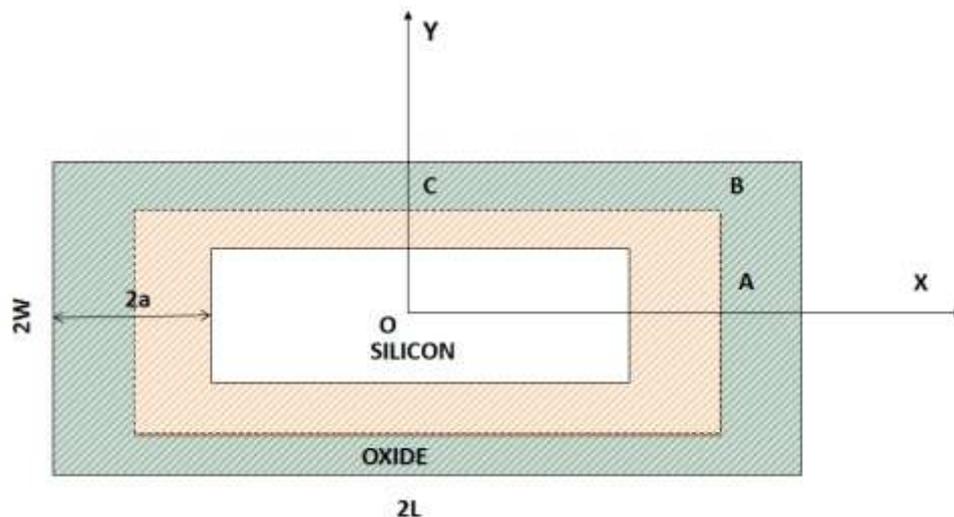


Fig. 1 :- The Pre deposition System

4.1 On Silicon Surface

Rate of change of concentration at any point = Rate of change of surface diffusion flux + Effective rate of arrival of boron from the source. This leads to

$$\frac{\partial c}{\partial t} = D_s \frac{\partial^2 c}{\partial x^2} + D_s \frac{\partial^2 c}{\partial y^2} + F_n \quad \dots(1)$$

4.2 On Oxide Surface

Rate of change of concentration at any point = Rate of change of surface diffusion flux + Effective rate of arrival of boron from the source – Rate of dissolution of boron in oxide. This leads to

$$\frac{\partial c}{\partial t} = D_{ox} \frac{\partial^2 c}{\partial x^2} + D_{ox} \frac{\partial^2 c}{\partial y^2} + F_n - G [Cl - Cox(t)] \quad \dots(2)$$

Where, $c = c(x,y,t)$ is the concentration per sq.cm. of the surface.

F_n is the effective constant rate of arrival of boron.

D_s is surface diffusion coefficient at the silicon surface.

D_{ox} is surface diffusion coefficient at the oxide surface.

The initial and boundary conditions are:

$$c(x,y,0) = 0 \tag{3}$$

$$\left. \frac{\partial c}{\partial x} \right|_{x=0} = \left. \frac{\partial c}{\partial x} \right|_{x=L+a} \tag{4}$$

$$\left. \frac{\partial c}{\partial y} \right|_{y=0} = \left. \frac{\partial c}{\partial y} \right|_{y=W+a} \tag{5}$$

The solution will give the variation of concentration with respect to time at different points in the window. This variation may then be used to determine the profiles of boron in the silicon bulk. The concentration in the silicon bulk is limited by the solid solubility limit.

V RESULTS AND ANALYSIS

To study window frame width effect, calculations are done with a window width of 40 μm and the frame width of 4, 8, 24, 60 and 100 μm. For window width effect, the resistor width have been taken to be 12, 20, 40 and 80 μm with a 100 μm wide window frame. The value of ρ_s (res) have been normalized and expressed as a percentage of ρ_s (plane) and are denoted by ρ_{sn}.

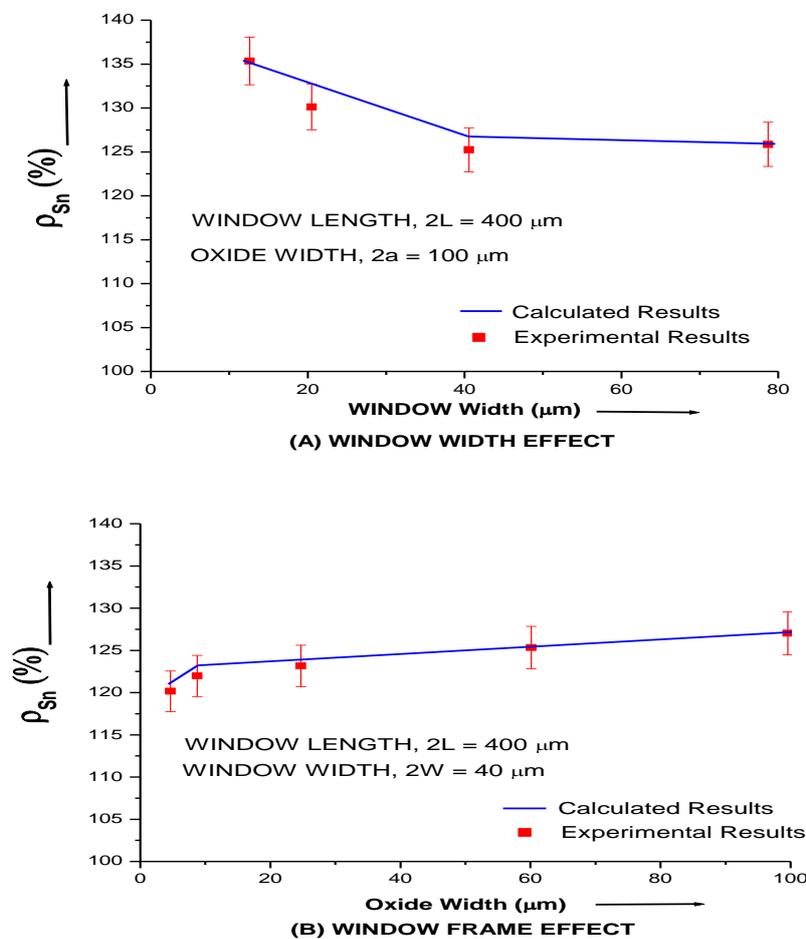


Fig. 2 Experimental and Computational Results

A good agreement between the experimental and calculated results are shown in Fig. 2. It has been found that as the window frame width is increased, the value of ρ_{sn} increases continuously at a much faster rate compared to experimental results. Also, the increase shows no sign of saturation as observed in experimental results. Similarly, in the window width effect, there is a continuous decrease in the value of ρ_{sn} with an increase in the window width with no signs of saturation.

VI CONCLUSIONS

A careful and accurate investigation of the effects of masking oxide on the diffusion of boron into silicon has been made. The model is based on the surface diffusion of boron over silicon assuming a high solubility of boron in the surrounding oxide. The calculations made suggest that model is capable of explaining the dependence of sheet resistance of boron doped layers on the patterning geometry. Thus it is concluded that the model is capable of explaining the effect of masking oxide on the diffusion of boron in silicon. A more accurate estimation of various parameters is however desired.

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AN EFFICIENT VLSI IMPLEMENTATION FOR 64 BIT ERROR TOLERANT ADDERS

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ABSTRACT

The adders are the basic elementary block which is used in most digital components. The probability of errors in the present VLSI technology is very high and it is increasing with technology scaling. In modern VLSI technology, the occurrence of all kinds of errors has become inevitable. The removal of all kinds errors is not an easy task and it is also not required for certain applications like image and video processing. For those certain applications approximate results are acceptable. Hence Error Tolerant Adder[ETA] is proposed for those certain applications which provide approximate result at a very high speed than other adders. ETA is an emerging concept in VLSI design. It uses logical OR operation for certain LSB bits hence it produces greater efficiency. The proposed adder provides improvement in delay, area and as well as cost of accuracy. The ETA is able to ease the strict restriction on accuracy and at the same time improvements in power and speed performance. The construction of ETA is simple and it also easy to implement.

Index terms: Error Tolerant Adder (ETA)

1.INTRODUCTION

In general adder circuit the result produced will be accurate but it would not be more efficient and it will also consume more time, area and power. When we consider an error tolerant adder even though the results are approximate the area consumed and power consumption would be less when compared with other conventional adders. In most digital adder circuit the delay of the output is due the carry propagation involved in the internal process and so to avoid this carry propagation delay this circuit has been designed . This elimination of the carry propagation will definitely affect the output and hence these eliminations are avoided in the MSB and normal adder circuits have been implemented on some MSB. By this method error may take place in the any part of certain least significant bits and hence it not have a great impact on the accuracy of the result. In certain applications the accuracy of the adders need not be considered and so the error tolerant adder can be used in such cases. The system

which incorporates this design will generate acceptable results and it may contain defect In its internal process but the error produced will be only to a certain number of least significant bits which will never affect the accuracy of the results in a major level. In ETA only basic logic gates are used which eventually reduces the complexity of the design and it also used in reducing other factors including time and cost. The level of the tolerant is also high when compared with other adder circuits.

II.DESCRPTION OF ERROR TOLERANT ADDER

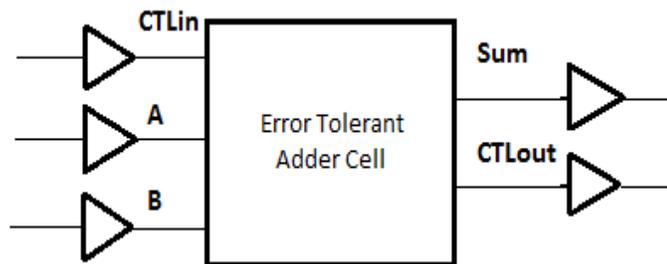


Fig 1: Error Tolerant Adder Cell

The above is the simple block diagram for the basic error tolerant adder cells. These adders perform only very basic addition using logic gates.

The usage of error tolerant has already been mentioned by comparing with the normal conventional adders. But there are few parameters through which we can calculate and obtain the approximate design for ETA. The following are the important parameters to calculate,

2.1 Calculation of Overall Error

The overall error is one of the important parameter to be considered. The overall error can be calculated using the formula,

OVERALL ERROR (OE): $|R_c - R_a|$, where R_c denotes the correct result and R_a denotes the approximate result.

The difference between those two results will give us the overall error in the circuit.

ACCURACY: Accuracy is generally called as the true value which gives out the perfect output for the inputs given..

$ACC = (1 - OE/R_c) \times 100\%$, and ranges from 0% to 100%.

TOLERANT: The potential of the adder to avoid the errors is the tolerance level of the adder. ETA has very high tolerance level

III.OPERATION OF THE ERROR TOLERANT ADDER

The operation of the ETA is briefly explained using a figure given below. It consists of both accurate and as well as inaccurate part. The inaccurate part is the one which gives out the approximate result at a very minimum level.

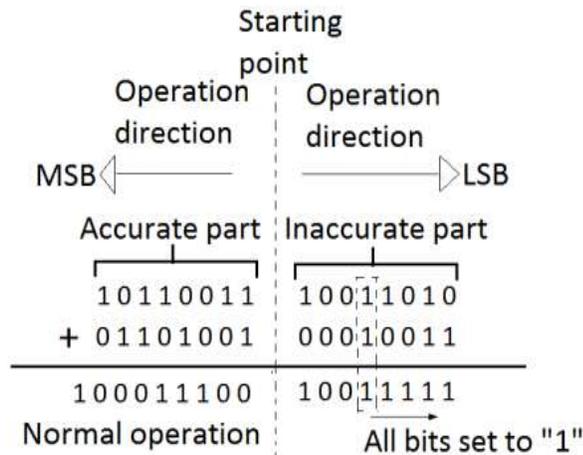


Fig 2: Operation Process Of ETA

The inaccurate part should be taken in the Least Significant Bit(LSB). The other MSB bits are bits are accurate which can be performed with some conventional adder. The LSB part which is considered as the inaccurate part is done with the simple AND and OR operation. The main function is that all the bits which are considered as inaccurate part should be set to 1 with the logical gate operation.

IV.IMPLEMENTING ETA IN HARDWARE

To implement ETA in hardware we need two different blocks namely addition block and control block. The addition block is used to perform a carry free addition and The control block is used to generate the control signals, to determine the working mode of the carry-free addition block.

4.1 Carry Free Addition Block

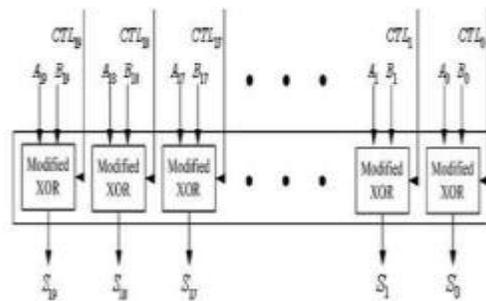


Fig 3: Carry Free Addition Block

The carry free addition is used to design the inaccurate part which is made of many different modified XOR gates which is showed in a block diagram above. In the modified XOR gate, three extra transistors, are added to a conventional XOR gate.

4.2 Control Block

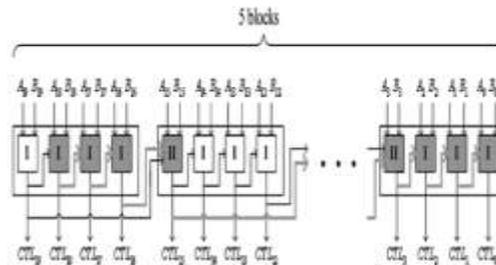


Fig 4: Control Block

The control block is to generate the clock signals for the carry free addition block. The control block is arranged into five equal-sized groups, with additional connections between every two neighbouring groups. The control signal generated by the leftmost cell of each group is connected to the input of the leftmost cell in next group. The extra connections allow the propagated high control signal to “jump” from one group to another instead of passing through all the 20 cells. Hence, the worst case propagation path consists of only ten cells.

V.CONSTRUCTION AND PERFORMANCE OF OTHER ADDERS

When we consider other conventional adders their construct will also be found little complex. But the proposed design of ETA is simple to construct because it consists of only logical gates. The performance is also found to be good and efficient than other adders. But only small drawback is that it shows only approximate output for the particular number of least significant bits. Not only the performance increases it is area efficient, the time delay is less and the power consumption is less than other conventional adders

This proposed ETA is efficient and can be used in many places where approximate results are acceptable which will produce good result.

VI.DELAY ANALYSIS

In this design certain amount of Least Significant Bits of both inputs does not undergo normal addition. They are passed through some basic as mentioned earlier which when analysed has reduced the time delay and area consumption. This tremendous decrease in area and delay has made this adder an efficient and highly reliable. The delay analysis of 64 bit ETA has been clearly demonstrated with neat charts

Device Utilization Summary			
Logic Utilization	Used	Available	Utilization
Number of 4-input LUTs	62	66,560	1%
Number of occupied Slices	40	33,280	1%
Number of Slices containing only related logic	40	40	100%
Number of Slices containing unrelated logic	0	40	0%
Total Number of 4-input LUTs	62	66,560	1%
Number of bonded I/Os	96	633	15%
Average Fanout of Non-Clock Nets	1.88		

Maximum combinational path delay: 17.141ns

Fig 5: Utilization and time delay for 16 bit ETA

Device Utilization Summary			
Logic Utilization	Used	Available	Utilization
Number of 4-input LUTs	31	66,560	1%
Number of occupied Slices	20	33,280	1%
Number of Slices containing only related logic	20	20	100%
Number of Slices containing unrelated logic	0	20	0%
Total Number of 4-input LUTs	31	66,560	1%
Number of bonded I/Os	49	633	7%
Average Fanout of Non-Clock Nets	1.87		

Maximum combinational path delay: 27.853ns

Fig 6: Utilization and time delay for 32 bit ETA

Device Utilization Summary			
Logic Utilization	Used	Available	Utilization
Number of 4-input LUTs	124	66,560	1%
Number of occupied Slices	80	33,280	1%
Number of Slices containing only related logic	80	80	100%
Number of Slices containing unrelated logic	0	80	0%
Total Number of 4-input LUTs	124	66,560	1%
Number of bonded I/Os	280	633	30%
Average Fanout of Non-Clock Nets	1.88		

Maximum combinational path delay: 49.276ns

Fig 7: Utilization and time delay for 64 bit ETA

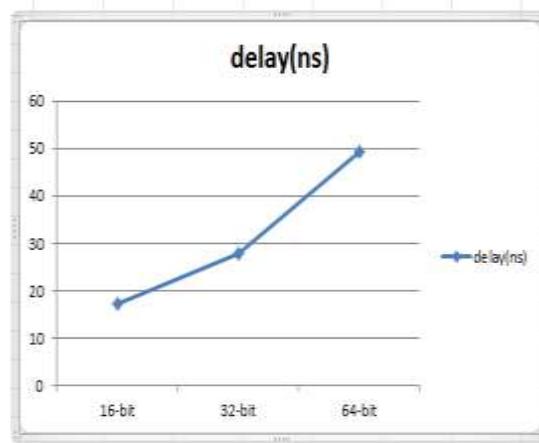


Fig 8: Overall delay analysis graph

VII.SIMULATION RESULTS

The simulation results for the above design clearly gives the approximate results from the addition of the given inputs which has been programmed using verilog HDL & Xilinx software overall power consumption of this 64 bit ETA IS 0000 watts and the memory is almost 167mb.

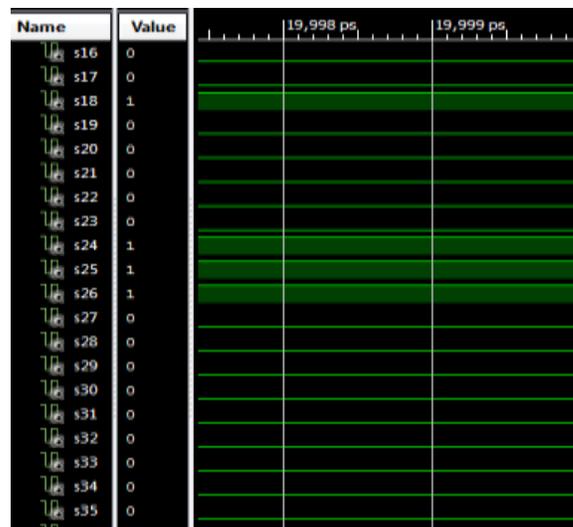


Fig 10: Simulation Results

VIII.CONCLUSION

In this paper , 64bit error tolerant adder has been designed using the verilog hdl and when compared with other adder it is clear that this design is more efficient and less power consuming. Even though it is superior in features than other adders it does not give accurate answers all the time and hence it is more suitable for the digital systems

where the speed is considered more than its accuracy. In digital systems this ETA can be implemented which will increase the performance of these systems. Our approach has been justified by the comparison made With other conventional adders and result obtained by the Xilinx software

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STATIC ANALYSIS OF COMPOSITE LEAF SPRING WITH NONLINEAR PARAMETERS

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ABSTRACT

In this paper Numerical analysis of composite leaf spring is carried out to find out effect of nonlinearities. For Linear and Nonlinear Finite element analysis ANSYS software is used. Experimental set up is developed in order to find out load-displacement characteristics of Composite Leaf spring. Load- displacement characteristics are studied in order to find out nonlinearities present in composite leaf spring. The present work deals with the numerical analysis of composite leaf spring with nonlinear parameters. In this paper Material and Geometric nonlinearities are considered.

Keywords: ANSYS, Composite Leaf Spring, E-Glass/Epoxy, Nonlinearity.

I INTRODUCTION

Composite materials consist of two or more physically dissimilar and instinctively separable components called reinforcement and matrix. These two components can be mixed in a restricted way to achieve optimum properties, which are superior to the properties of each individual component. Composite materials have been widely used in automobile industry because of its high strength and modulus to weight ratio, low cost and flexibility in material and structure design. The suspension leaf spring is one of the potential items for weight reduction in automobile as it accounts for ten to twenty percent of the unsprung weight. This helps in achieving the vehicle with improved riding qualities. Since the strain energy in the spring is inversely proportional to density and young's modulus of the material, it is always suggested that the material for leaf spring must have low density and modulus of elasticity. Many research have been carried out in the direction to replace conventional steel leaf spring by composites [1]. CAE tools are widely used in the automotive industries. In fact, their use has enabled the automakers to reduce product development cost and time while improving the safety, comfort, and durability of the vehicles they produce. The predictive capability of CAE tools has progressed to the point where much of the design verification is now done using computer simulation rather than physical prototype testing. Even though there have been many advances in CAE and it is widely used in the engineering field, physical testing is still used as

a final confirmation for subsystems due to the fact that CAE cannot predict all variables in complex assemblies, therefore the validation of CAE results is important [2]. In this analysis the material of mono leaf spring is E-glass epoxy. There are four layers of material lay up by following way:

The E-glass Epoxy is also type of fiber. SiO_2 54wt%, Al_2O_3 14wt%, $\text{CaO}+\text{MgO}$ 22wt%, B_2O_3 10wt%, $\text{Na}_2\text{O}+\text{K}_2\text{O}$ less than 2wt%. The properties of E-glass epoxy material used for the analysis are as follows:

II MATERIAL PROPERTIES OF E-GLASS EPOXY

Sr. No.	Property	Value
1	Tensile Modulus Along X-Direction	34000MPa
2	Tensile Modulus Along Y-Direction	6530MPa
3	Tensile Modulus Along Z-Direction	6530MPa
4	Tensile Strength of Material	900MPa
5	Compressive Strength of Material	450MPa
6	Shear Modulus Along XY-Direction	2433MPa
7	Shear Modulus Along YZ-Direction	1698MPa
8	Shear Modulus Along ZX-Direction	2433MPa
9	Poisson Ratio Along XY-Direction	0.217
10	Poisson Ratio Along YZ-Direction	0.0366
11	Poisson Ratio Along ZX-Direction	0.217
12	Mass Density	$2.6 \times 10^{-3} \text{Kg/mm}^3$
13	Flexural Modulus	40000MPa
14	Flexural Strength	1200MPa

III NUMERICAL ANALYSIS

The Finite Element Method (FEM) is a practical application often known as Finite Element Analysis (FEA) is a numerical technique for finding approximate solutions of partial differential equations (PDE) as well as of integral equations. Finite Element Analysis is a simulation technique which evaluates the behavior of components, equipment and structures for various loading conditions including applied forces, pressures and temperatures. Thus, a complex engineering problem with non-standard shape and geometry can be solved using finite element analysis where a closed form solution is not available. The finite element analysis methods result in the stress distribution, displacements and reaction loads at supports etc. for the model. The three-dimensional model of spring is drawn in CATIA V5 R16 environment. This geometry is imported to ANSYS environment. 20 node hexahedral element SOLID-95 used for meshing of the geometry. Meshing is done by Hexagonal Sweep. The geometry can be meshed

by 10 node tetrahedron element as well but tetrahedron is stiffer as compared to hexahedron element so results in lower accuracy [3]. In this paper linear and nonlinear analysis of composite leaf spring is carried out using ANSYS. In finite element analysis 3D model of mono leaf spring is developed. After modeling of leaf spring the actual supporting boundary conditions are given i.e. fixed support and cylindrical support. In fixed support there is no any degree of freedom i.e. there is no displacement at any direction. But in cylindrical support only vertical excitation or motion is present and horizontal motion is restricted. This condition is real on TATA-SUMO leaf spring.



Fig.1 Cad Model of Leaf Spring

In ANSYS the Cad Model of composite leaf spring is developed. After that for analysis the Finite element model is generated. At the point of application of load the fine meshing is done. After meshing we get total 18054 No. of Nodes and 4198 No. of Elements.

Fig.2 Shows meshed model of composite leaf spring. Fig.3 shows displacement in y direction of linear composite leaf spring at 50N load.

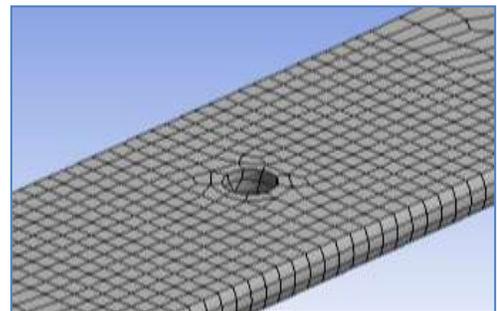
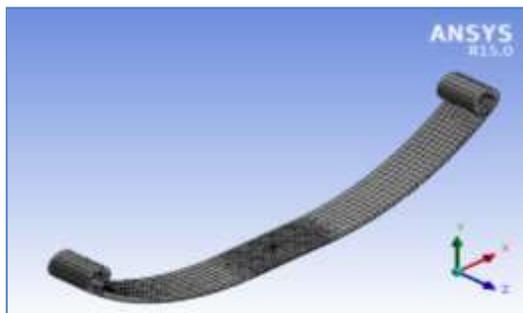


Fig.2 Meshed Model of Composite Leaf Spring

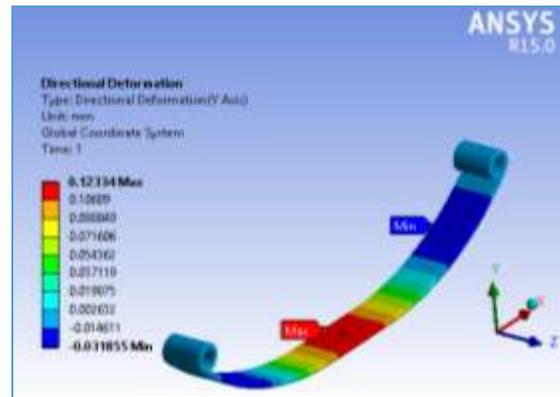


Fig.3 Directional Deformation at 50N of Linear Composite Leaf Spring.

3.1 Nonlinear Finite Element Analysis

Nonlinear Analysis includes Material based non-linearity: Force (stress) Vs. Displacement (strain) curve is Nonlinear (polynomial). Geometric non-linearity: In real life, the stiffness $[K]$ is a function of displacement $[d]$. This means in a geometric nonlinear analysis, the stiffness K is re-calculated after a certain predefined displacement. Contact non-linearity: In Contact analysis, the Stiffness K also changes as a function of displacement (when parts get into contact or separate). Non-linear analysis deals with true stress and strain (unlike engineering stress and strain in linear static analysis)[4].

In this paper Material and Geometric nonlinearity is considered to find out load deflection characteristics and maximum equivalent stress contours (Von Mises Stress plots).

For maximum load acting on leaf spring 46.58 MPa equivalent stress is developed which is far below yield strength of material, hence design of composite leaf spring is also safe. Fig.4a shows directional deformation at 50 N of Linear Composite Leaf Spring and Fig.4b shows Maximum equivalent stress in Nonlinear Composite Leaf Spring.

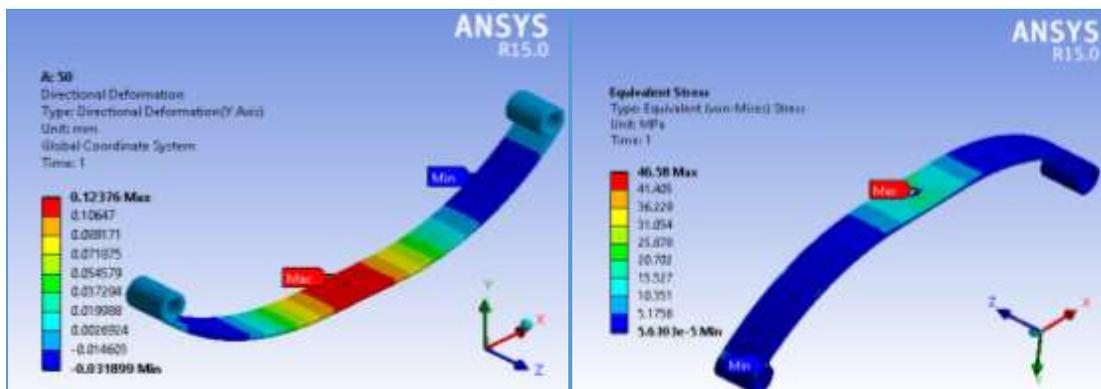


Fig.4a

Fig.4b

Fig.4a- Deformation at 50N of Linear Composite Leaf Spring.

Fig.4b- Maximum Equivalent Stress in Non-Linear Composite Leaf Spring.

IV EXPERIMENTAL RESULTS

The experimentation is done by using universal testing machine. The loads are applied by using the universal testing machine. At various loads the deflection of composite leaf spring is measured. The following results are obtained during the experimental static analysis of composite leaf spring.

V RESULTS AND DISCUSSIONS

Table 1 shows the Comparative Load-displacement characteristics of Numerical Linear and Nonlinear Composite Leaf Spring and Experimental Analysis.

Table. 1: Comparative Load-displacement Characteristics

Sr.No.	Load (N)	Linear Displacement	Non-Linear	Experimental
1	50	0.12334	0.12376	0.12776
2	100	0.24667	0.24838	0.28838
3	150	0.37001	0.37387	0.38238
4	200	0.49334	0.50024	0.51215
5	250	0.61668	0.6175	0.62575
6	500	1.2334	1.27375	1.35458
7	700	2.4667	3.2295	3.65451

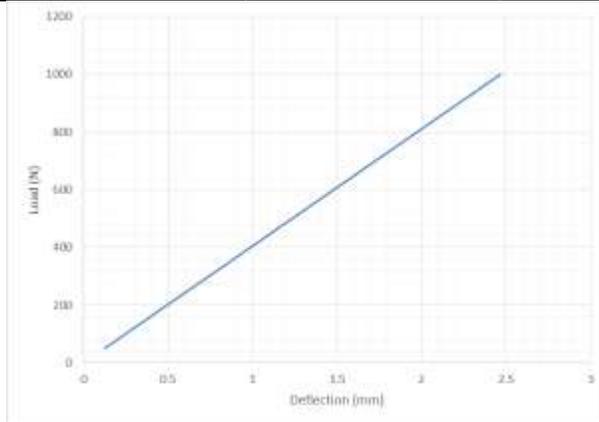


Fig.5a

Fig.5a- Load Deflection Characteristics of Linear Composite Leaf Spring.

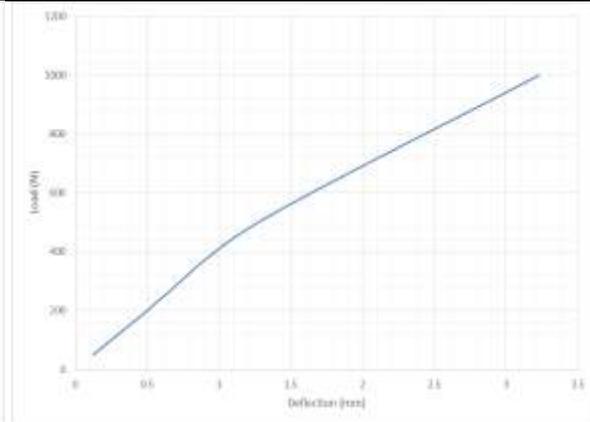


Fig.5b

Fig.5b- Load Deflection Characteristics of Nonlinear Composite Leaf Spring.

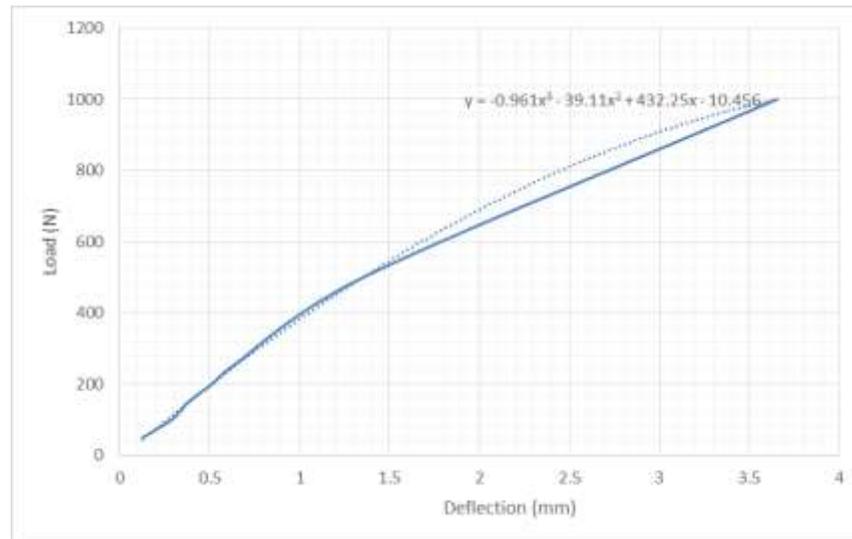


Fig.5c-Experimental Load Deflection Characteristics of Composite Leaf Spring.

From Experimental Load-Displacement Characteristics it is observed there is good agreement between load-deflection characteristics of Nonlinear Composite leaf Spring and Experimental Load-Deflection results, therefore in order to find out non-linear effects included in the spring force f_s , it is modeled as third order polynomial function as

$$F_s = k_0 + k_1\Delta x + k_2\Delta x^2 + k_3\Delta x^3$$

Where the co-efficients are obtained by fitting the experimental data, which resulted in $k_3 = -0.961 \text{ N/mm}^3$, $k_2 = -39.11 \text{ N/mm}^2$, $k_1 = 432.25 \text{ N/mm}$ and $k_0 = -10.465 \text{ N}$. Hence, in order to model the nonlinearities in Leaf spring above equation will be used, which includes the nonlinear effects in spring.

V CONCLUSION

Comparative Nonlinear static analysis of Composite Leaf spring used in Medium utility vehicle is carried out. Nonlinearities present in spring are found out. The numerical results from Nonlinear Finite Element Analysis showed in general a good agreement with the experimental values. However, differences appear indicating the necessity to improve the model input data and the experimental procedure. By using nonlinear analysis we can simulate real life conditions which were not possible in linear analysis, hence it is essential to use nonlinear analysis to get real life results.

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