Books / Conference Papers

Imran Khan

Effect of Uncertain Parameters on Vibrational Characteristics of Plate

Working as Associate Professor in Mechanical Engineering Department in Priyadarshani College of Engineering Nagpur (India). The total teaching experience is of 17 years. The area of Research work is plate vibration.The total Paper published national and international level are 26.

Vibrations are a part of everyday human life in one form or another. Vibrations have both a great and devastating effect on human society. In general, applications of vibration analysis cover a broad spectrum and contribute towards many fields such as mechanical, civil engineering and medicine for identification and evaluation of vibration phenomena, validation, structural integrity assessment, structural modification, and damage detection

Dr. S. N. Waghmare: Human Powered Stirrup making machine
(Design and Fabrication)

Stirrup Making Machine

Subhash Waghmare
Sagar Shelare

Human Powered Stirrup
Making Machine

Design & Fabrication

Waghmare, Shelare

Dr. P. B. Khope: Sheet Metal Bending Processes and Die Design

Scholars'
Press

Sheet Metal Bending & Die Design

Khope

Pravin Khope

Sheet Metal Bending Processes & Die Design

V-Bend

Sheet Metal Bending Processes & Die Design

Bending is a process by which a straight and flat sheet metal is transformed into a curved surface through the use of standard dies sets. The sheet metal operations carried on press are grouped into two categories, cutting operations and forming operations. In cutting operations, the workpiece is stressed beyond its ultimate strength. The stresses induced in the metally appear forces are shearing stresses. In forming operations, the stresses are below the ultimate strength of the metal. The forming operations include bending, drawing, redrawing, squeezing. The inner sheet-radius at the end of bending is classified as one of most significant parameter in V-Die bending. This radius determines the strain level in the bending region and thereby whether there is risk of fracture in sheet metal at the bend line can be minimized. The processer knows the minimum bend radius for the particular material, then different types of bending method are analyzed. The theoretical analysis is developed for minimum bend radius considering the failure criterion.

Dr. Pravin Khope have been conferred with PhD degree from RTM Nagpur University in year 2016. He is working as Workshop Superintendent & Faculty in Mechanical Engineering Department. Priyadarshni College of Engineering, Nagpur. He have more than 22 years of teaching experience & research focused on the industrial and manufacturing processes.

Subhash Waghmare
Sagar Shelare

Human Powered Stirrup Making Machine

### Design & Fabrication

MECHANICAL MEASUREMENT AND METROLOGY

For 5th Semester in Mechanical Engineering

Dr. Nitin K. Mandavgade
Prof. Jayshri M. Lanjewar

It has been a trend well adopted by humans to achieve greater accuracy and enhance the efficiency of existing technology. It is become very important to keep balance between nature and need of human for continuation of human race. Though the economical and technological development is achieved on the cost of renewable energy but on the same time one has to think about other energy sources by which one can balance the technology with nature. Insects are largely responsible for the crop destruction in farm. Agriculture sector is facing problems with capacity issues, shrinking revenues, and labour shortages and increasing consumer demands. The prevalence of traditional agriculture equipment intensifies these issues. In addition, most formers are desperately seeking different ways to improve the equipment quality while reducing the direct overhead costs (labour) and capital. Thus, a significant opportunity rests with understanding the impact of a pesticide sprayer in an agriculture field. So a need to develop pesticide spray pump with an increased tank capacity as well as should result in cost reduction, labour and spraying time. Thus to reduce these problems, this research.
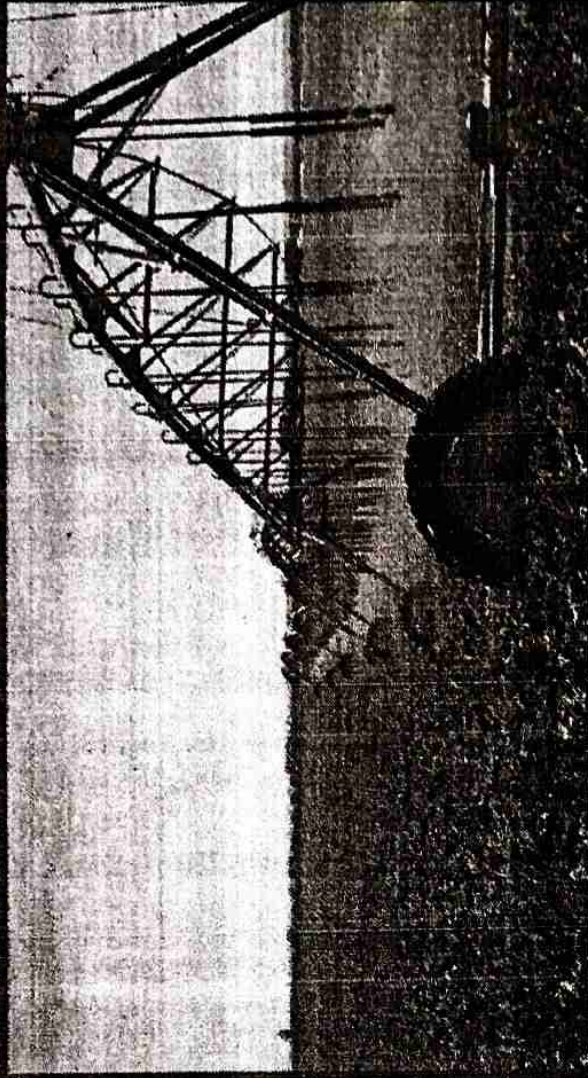
Pravin Khope
Sagar Shelare
Akhilesh Bhatkar

Low Cost Agricultural Mechanization

Manual Push Operated Pesticide Spraying Machine

Dr. P. B. Khope have been conferred with PhD degree from RTM Nagpur University in year 2016. He has working as Workshop Superintendent & Faculty in Mechanical Engineering Department, Priyadarshini College of Engineering, Nagpur. He have more than 20 years of teaching experience & research focused towards the agricultural mechanization.
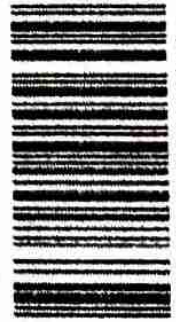
DESIGN APPROACH TO MEASURE BMI OF HUMAN

[1]Tushar Hatwar, [2]Saurabh Jagshettiwar, [3]Ketan Navghare, [4]Adhiraj Joshi, [5]V.V.Panchbhais

[1234]Student, [5]Assistant Professor,

Dept. of Electronics and Telecommunication Engineering,

Priyadarshini College of Engineering, Nagpur, Maharashtra, India

Abstract: India, being economically more maturating country, developments are going on in every sector. Due to the introduction of technology almost in all fields, working efficiency has enormously increased thereby reducing time. For a country to grow, its manpower plays a vital role. People of young generation and their extraordinary efforts leads indirectly to the overall progress of the country. People now a days found to be very health conscious, due to the fast paced life is having adverse effects on their body. As a better health leads to better work efficiency and a better life ahead. For this, conventionally, to know actual body weight, BMI (Body Mass Index) is a technique. With this people come to know, if they are underweight, overweight or having a perfect weight. As our project is an introduction of a technology into a medical field, additionally by designing a machine that measures human BMI. BMI technique gives a measure of weight and accumulation of fats in human body. But our machine gives measure of human weight and height as well. As per the concept, that for a particular height, weight should be managed. Using this, our machine is a combination of two machines and gives accurate feedback also; which is helpful and less time consuming. Due to the availability of medical facilities now a days near by, it has become little easier to maintain the health. Even though in many countries, there is an issue of obesity comes to the fore with a serious health problem. By taking action against it before encountering any severe physical disease, prevention is better than cure. So using this new technique of BMI, people can get perfect measure of weight and height as well and if there is a person in underweight or overweight condition, he will get a feedback according to that. This is definitely helpful in hospitals and healthcare centers

Keywords: RFID Tags, RFID Module, Load cell, Ultrasonic Sensor, Microcontroller PIC18F45K22

1. INTRODUCTION

People in the world, specially most hardworking age is 20 to 35 years roughly, found to be concerned about their health. For better life to live, health is wealth, undoubtedly and for that there are many appliances in market to maintain it. Not only the above mentioned age group people but people above 35years age, to be fit, they need to know their weight. And for this, frequent concern to doctor is difficult. To reduce this inconvenience and for saving of time and money, to know BMI, there is a technology that automatically calculates it and give measure of the weight to the customer [3].

This system is a design and approach to measure human BMI, in addition to that it measures height also according to the concept that as per the height weight should be adjusted [2]. This machine is user friendly and gives accurate measure of BMI with proper feedback. Our machine ask about gender of the user because BMI is different for men and women due to the difference in their metabolism. Table no. (1) shown below describes the categories of BMI according to height and weight of male and female.

2. OBJECTIVE

The aim of the project was to design a BMI unit which gives numeric value and this numeric value gives a percentage which correlates to the body fat composition.

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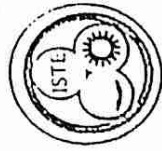
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③

Design and Modification of Innovative Motorized Hand Truck

Dr. M. K. Sonpimple[1], Sagar D. Shelare[2], Anurag N. Raghorte[3]

[1]Associate Professor,Department of Mechanical Engineering,Priyadarshini College of Engineering,
Near CRPF campus, Hingna Road,Nagpur- 440019
[2]Assistant Professor,Department of Mechanical Engineering,Priyadarshini College of Engineering,
Near CRPF campus, Hingna Road,Nagpur- 440019
sagmech24@gmail.com
[3]Mtech Scholar,Department of Mechanical EngineeringPCE,Nagpur, India
anuragsraghorte@gmail.com

Abstract – *Over the time certain principles have been found to be applicable in the analysis, design. And operation of material handling systems.All material handling should be the result of a deliberate plan where the needs, performance objectives, and functional specification of the proposed methods are completely defined at the outset. The principles of material handling' are listed and explained. Implementing these principles will result in safer operating conditions, lowa costs, and better utilization and performance of material handling systems,commercial organization, where the goods are prepared they need to transport their goods from one place or one station to another. For this purpose, they use hand trolley or also known as hand truck on which the load is handled manually from one place to another. Sometimes, it is difficult with this equipment to transport or carry the load manually. In this paper, some design and modification is practically done on the modelled hand truck. Further, it is been motorized which make it simpler for the use instead of manual operation. Design of the model is done in modelling software called Creo Parametric 2.0 and considering several factors, the analysis will be done in analysis software called Ansys 14.0.*

Key words:Hand truck, trolley, motored wheel, ANSYS,CREO-PARAMETRIC 2.0.

I. Introduction

The use of powered and non-powered industrial trucks is subjected to certain hazards that cannot be completely eliminated by mechanical means. But by the intelligence practice and common sense, we can optimize the risks which are to be incorporated. It is therefore essential to have competent and careful operators, physically and mentally fit, and thoroughly trained in the safe operation of the equipment and the handling of the loads. Overloading, poor maintenance, load instability, collision with other objects or hurdles are some of the serious hazards for the model.

Why Should the Workplace Be Improved?
Due to manual handling of the container, it may extrude workers to several physical problems (e.g. force, awkward postures, and repetitive motions) that can lead to major as well as minor injuries, wasted energy and wasted time. To avoid these problems, the coming demand of work tasks and the workers' capabilities can be improved coming from the organization. In short, changing workplace by improving benefit workplace by:

i. Reducing or preventing injuries.
ii. Reducing workers' efforts by decreasing forces in lifting, handling, pushing and pulling materials.
iii.Increasing productivity, product and service quality and worker morale.
iv.Lowering costs by reducing or eliminating production bottlenecks, error rates or rejections, use of medical services because of musculoskeletal disorders, workers' compensation claimsand retraining.

What to Look for?
Due to manual handling of the container, it may extrude workers to several physical problems. If these tasks are performed repeatedly or over long periods of time, they can lead to fatigue and injury. The main risk factors or conditions associated with the development of injuries in manual material handling tasks include:

1. Awkward postures (e.g., bending, twisting)
2. Repetitive motions (e.g., frequent reaching, lifting, carrying)
3. Pressure points (e.g., grasping [or contact from] loads, leaning against parts or surfaces that are hard or have sharp edges)

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Design and fabrication of River Waste Cleaning Machine

Mr. P. M. Sirsat[1], Dr. I. A. Khan[2], Mr. P. V. Jadhav[3], Mr. P. T. Date[4]

1,2,3,4 Assistant Professor, Mechanical Engineering Department, Priyadarshi College of Engineering, Nagpur, India

Abstract — *This paper emphasis on design and fabrication details of the river waste cleaning machine. The work has done looking at the current situation of our national rivers which are dump with crore litres of sewage and loaded with pollutants, toxic materials, debris etc. The government of India has taken charge to clean rivers and invest huge capital in many river cleaning projects like "Namami Gange", "Narmada Bachao" and many major and medium projects in various cities like Ahmadabad, Varanasi etc.*

By taking this into consideration, this machine has designed to clean river water surface.

Keywords— Sewage, pollutants, toxic, garbage & pollution.

IV. CONSTRUCTION AND WORKING PRINCIPLE

The machine consists of collecting plate coupled with conveyor belt and chain drives which rotate by the PMDC motor. The collected waste is thrown on the collecting tray. Propeller is used to drive the machine on the river & run with help of PMDC motor. The total electrical devices are controlled by RF transmitter and receiver which use to control the machine remotely..

V. DESIGN CALCULATIONS

Motor Calculation

Motor Specifications

Speed =30 Rpm

Volt = 12 v

QUANTUM DOT LASERS FOR COMMUNICATION APPLICATIONS

SWATI S. SOLEY

Department of Applied Physics, Priyadarshini College of Engineering, Nagpur
440015- India
swati17soley@gmail.com

Abstract: In recent years Semiconductor quantum dots of different materials are developed. In the field of lasers, semiconductor lasers manufactured by quantum dots are the next step in the development towards better temperature stability, lower thresholds and narrower emission line widths owing to their carrier confinement in all three dimensions. The emission wavelength of QDs depends on the dot size and in the case of semiconductor nano crystals, color can be controlled precisely through simple chemistry. In this paper we discuss about the Quantum Dot Lasers and development in fabrication techniques of quantum dot lasers. We also discuss advantages and a few applications of quantum dot lasers in the field of telecommunication.

Key words-Lasing threshold, optical gain, Quantum dot laser

INTRODUCTION:

During the previous decade, there was an intensive interest on the development of quantum dot lasers. The unique properties of quantum dots allow QD lasers obtain several excellent properties and performances compared to traditional lasers and even QW lasers. The advantages of quantum dot based lasers compared to other conventional technologies have been realized for several years. Especially the free geometric parameters of quantum dot layers give probabilities to tailor the spectral gain profile applied to different types of QD lasers applications (Hadass et al.,2004).

QD lasers acquired more importance after significant progress in nanostructure growth in the 1990's such as the self-assembling growth technique for InAs QDs. The first demonstration of a quantum dot laser with high threshold density was reported by Ledentsov and colleagues in 1994. QD lasers are not as temperature dependent as traditional semiconductor lasers. This theory was utilized by applications and in 2004; temperature-independent QD lasers were invented in Fujitsu Laboratories.

The main advantages of Quantum dot lasers are that it emits light at wavelengths determined by the energy levels of the dots, rather than the band gap energy. Thus, they offer the possibility of improved device performance and increased flexibility to adjust the wavelength (Eberl,).Secondly, it has the maximum material gain and differential gain, at least 2-3 orders higher than Quantum Wire lasers. It also shows superior temperature stability of the threshold current. Due to these advantages Quantum dot lasers are becoming important tool in the field of telecommunication for obtaining better speed and data transfer rate.

Quantum Dots-

Quantum dots (QD) are semiconductor nanostructures having large industrial applications as well as are of great scientific and technological interest. Their electronic structures can be altered by changing their sizes and shapes, leading to many new applications from infrared detectors, laser, photoluminescence to solar cells. The properties can be tailored by changing its dimensions from, say a size of few centimetres to a smaller size below hundred nano meters. If only one dimension is reduced to the nano range , then we obtain a structure known as quantum well. This reduction in dimension produces confinement of the electrons that also refers to the number of degrees of freedom in the electron momentum. If two dimensions are reduced and one remains large, the resulting structure is called as a quantum wire. The reduction in size in all the three dimensions is called a quantum dot. The confinement of these structures can be obtained by two different methods known as - top-down and bottom-up approaches.

Quantum confinement effect occurs when one or more of the dimensions of a nano crystal approach the Exciton Bohr radius. The concepts of energy levels, band gap, conduction band and valence band still apply. However, the electron energy levels can no longer be treated as continuous - they must be treated as discrete.

Quantum Dot Lasers-

A quantum dot laser consists of a laser host material; a plurality of quantum dots disposed in the host material; and a pumping source for exciting and inducing a population inversion in the quantum dots. Generally speaking, a quantum dot laser is composed of laser matrix material. The laser operation is based on producing radiative emission by coupling electrons and holes at non equilibrium conditions to an optical field. This occurs when a medium has more population of electrons in the excited quantum level than in the ground level. This situation is called as population inversion and is produced by either electrical stimulation or optical simulation. Another different process in this is spontaneous emission, whereby the electron returns to the ground state in the natural course even in the absence of any photon to stimulate it.

Quantum Dot Lasers- Historical Development

Lasing in QDs was first reported In 1991 by Vandysheve et al (Vandyshev et al,1991) and was practically achieved in an optically pumped device with CdSe nano particles of approximate size of 10 nm. The CdSe QDs were fabricated by high-temperature precipitation in molten glass. Lasing was also observed for QDs grown by epitaxial techniques in 1994 by Ledentsov (Ledentsov et al.,1994)

The QD lasers showed an improved performance and exhibit a lower lasing threshold and enhanced temperature stability as compare with quantum-well lasers. These successes

ENERGY TRANSFER AND PHOTOLUMINESCENCE STUDY OFLANTHANIDE IONS DOPEDMETAPHOSPHATE Ce(PO₃)₃

S.U. BHONSULE^, DEEPALI MARGHADE^B, S.P.WANKHEDE^C, AND S.V.MOHARIL^D

(a)Department of Physics, Priyadarshini College of Engineering, Nagpur, India
(b)Department of Applied Chemistry, PriyadarshiniInstitute of Engineering& Technology, Nagpur, India
(c)Department of Physics, K.D.K.College of Engineering, Nagpur, India
(d) Department of Physics, Nagpur University, Nagpur, India
subhonsule@gmail.com

Abstract: Ce(PO₃)₃ doped with Dy³⁺,Tb³⁺ phosphors were synthesized using solid state diffusion method. The characterization of prepared samples were done by X-Ray diffraction and photoluminescence. Appreciable luminescence has been observed in Ce(PO₃)₃ indicating weak interaction among Ce³⁺ ions. On the other hand considerable energy transfer was observed from Ce³⁺ to Dy³⁺ and Tb³⁺ ions.

Key words: Cerium metaphosphate, photoluminescence, Solid State Synthesis, Energy Transfer.

INTRODUCTION:

The inorganic compounds with general formula Ln(PO₃)₃ (Ln=La to Lu and Y) belong to the broader class of phosphate materials which have been extensively investigated because of a suitable absorption in the VUV region, a wide bandgap together with a high chemical stability, and the relative simplicity of powder synthesis(Hachani et al.,2010;Wang et al.,2007). Due to their desirable optical properties these rare earth meta phosphates, RE(PO₃)₃, have been the subject of considerable industrial interest(Clark et al.,2006;Carini et al.,1997,1998).The Ce³⁺luminescence was studied in Ce(PO₃)₃(Ternane et al.,2008) and in Lu(PO₃)₃(Yuan et al.,2008). These materials are potential good phosphors, scintillators, plasma display panels(PDP), mercury-free lamps, and visible lasers and detectors for ionizing radiation.For a mercury-free lamp, the excitation energy is mainly composed of VUV radiation, but most of the VUV energy is absorbed by the host crystal. If the energy can be transferred from the host to the rare earth ions, the rare earth ions can emit visible light. So the host absorption efficiency and the energy transfer efficiency play a very important part in applying VUV-excited phosphors to the mercury-free lamp. The scintillator properties of Pr(PO₃)₃ were studied byJouini(Jouini et al.,2003). The first investigation of Nd³⁺ luminescence in La(PO₃)₃ was reported by Jouini and co-authors while doing a research on laser materials (Jouini et al., 2002). The luminescence properties of Eu³⁺ andTb³⁺ in La(PO₃)₃ and Y(PO₃)₃ as potential phosphors under VUV excitation have also been reported(Wang et al.,2007; Wang et al.,2011; Ternanea et al.,2005). In Ln-based phosphate compounds the energy migration and transfer processes has also been studied (Hachani et al.,2010; Kiliaanet al.1988; Buijs et al.,1988). Ln(PO₃)₃ (Ln=La to Lu and Y) is one of the complex phosphates, which can adopt two different crystal structures depending on the ionic radius of the Ln ion. Ln(PO₃)₃ (Ln=La to Gd) with a large radius of the Ln ion crystallizes in an orthorhombic structure with C222₁ space group, while those with small radius of Ln ion (Ln= Gd to Lu

and Y) crystallize in the monoclinic crystal structure with P2₁/c space group (Höppe et al.,2011).Also it is well known that the coordination environment of cationic sites can strongly influence the luminescent properties of lanthanide ions in the two Ln(PO₃)₃ phosphate structures (Wang et al.,2011). La(PO₃)₃ with the orthorhombic crystal structure has only one La-site with eight fold coordination that is available for the trivalent lanthanide ion dopant. Therefore, the luminescence spectroscopy of lanthanide ions in La(PO₃)₃ has been studied particularly to establish where the lanthanide impurity energy levels are located(Shalapska et.al., 2014).

There are not many studies on luminescence of Cerium compounds. This is rather surprising considering that rare earth ions possess interesting luminescence properties. Amongst rare earth ions, Ce³⁺ exhibits rather peculiar emission which is in form of a two humped broad band, due to split ground state. Ce³⁺ exhibits intense emission(Ingole et al.,2010) due to allowed electric dipole transitions corresponding to transitions from levels of 5d¹ configuration to ²F_j states of 4f¹ configuration with fast decay time of the order of several nano seconds. Quenching usually occurs at high concentrations (Blasse et al.,1969) barring some exceptions like YAG:Ce. Many, but not all, stoichiometric cerium compounds exhibit strong luminescence e.g. CePO₄ shows intense emission with a quantum efficiency of 40%. CeF₃, CeBO₃ are other examples. Even some hydrated salts of cerium show strong emission .On the other hand CeAlO₃ does not fluoresce. Concentration quenching occurs due to energy transfer between similar ions and finally to a killer site. Energy transfer from Ce³⁺ to Ce³⁺ has been considered by Botden et al.(1952) and Blasse et al.(1967)and occurs over distance of 15-20 Å. The emission and absorption transitions of Ce³⁺ are allowed as electric dipole transitions. Energy transfer is therefore expected to be proportional to R⁶ where R is the Ce³⁺- Ce³⁺ distance.

In this paper wereportsynthesis and photoluminescence of metaphosphateCe(PO₃)₃. Various energy transfer processes Ce³⁺Tb³⁺, Ce³⁺Dy³⁺ are also reported.

Energy Transfer and Photoluminescence Study of Polyphosphate Ce(PO$_3$)$_3$:Dy^{3+}

Bhonsule Sharmila, Wankhede Sangeeta and **Moharil Sanjiv**

Department of Physics, K.D.K. College of Engineering Nagpur, Nagpur
Email: spwankhede20@gmail.com

Highlights—

- High temperature Solid State Synthesis, Efficient Energy transfer from Ce^{3+} to Dy^{3+}.

The inorganic compounds with general formula Ln(PO$_3$)$_3$ (Ln=La to Lu and Y) belong to the broader class of phosphate materials which have been extensively investigated because of a suitable absorption in the VUV region, a wide bandgap together with a high chemical stability, and the relative simplicity of powder synthesis. Rare earth meta phosphates, RE(PO$_3$)$_3$, have been the subject of considerable industrial interest on account of their potential as luminescent and lasing materials due to their desirable optical properties. These materials are potential good phosphors, scintillators, plasma display panels(PDP), mercury-free lamps, and visible lasers and detectors for ionizing radiation. For a mercury-free lamp, the excitation energy is mainly composed of VUV radiation, but most of the VUV energy is absorbed by the host crystal. If the energy can be transferred from the host to the rare earth ions, the rare earth ions can emit visible light. So the host absorption efficiency and the energy transfer efficiency play a very important part in applying VUV-excited phosphors to the mercury-free lamp. Dy^{3+}-activated phosphors are promising white light phosphors and can be used in mercury-free lamps. Dy^{3+} can be sensitized by Bi^{3+}, Gd^{3+}, Ce^{3+}, Pb^{2+} and Vanadate ions. Luminescence of rare earth RE ions could be enhanced by the nonradiative resonant energy transfer from a RE ion behaving as an energy donor to the other one as an energy acceptor.

Dy^{3+} doped Ce(PO$_3$)$_3$ phosphors were synthesized by the high temperature solid-state method. The phase and structure have been investigated by the X-ray powder diffraction. Dy^{3+} emission falls mainly in two lines in the visible region arising from $^4F_{9/2} \rightarrow {}^6H_{15/2}$ (470 -500 nm) and $^4F_{9/2} \rightarrow {}^6H_{13/2}$(570 nm) transitions. The relative intensities of the two bands depend on the local symmetry. When the ratio of blue to yellow emission is appropriate, one can obtain white emission using Dy^{3+}. Two very intense and sharp peaks at 478 and 571 nm are obtained in emission spectra for Dy^{3+} for 295 nm excitation. These correspond to $^4F_{9/2} \rightarrow {}^6H_{15/2}$ and $^4F_{9/2} \rightarrow {}^6H_{13/2}$ transitions of Dy^{3+}. The broad band around 338 nm is due to Ce^{3+}. Ce^{3+} emission peak at 338 nm overlaps with the f-f excitation lines for Dy^{3+}. Hence, energy transfer is seen from Ce^{3+} to Dy^{3+} ions. The transfer of energy from Ce^{3+} to Dy^{3+} ions in the Ce(PO$_3$)$_3$ lattice brings Ce^{3+} to the ground state and Dy^{3+} to the excited state. The emission in Dy^{3+} comes via a non-radiative transition to the $^4F_{9/2}$ level, followed by radiative transitions to $^6H_{15/2}$ and $^6H_{13/2}$ level. The Dy^{3+} emission was studied for various concentrations. The emission intensities increase with increasing concentration. The highest intensity was observed for 0.5% Dy^{3+}. Concentration quenching was observed for higher concentrations. The concentration quenching mechanism is generally associated with energy transfer. Energy transfer phenomena can lead to the development of new and efficient photoluminescence materials.

ID: 1063

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Synthesis and Photoluminescence in Yb doped Cerium Phosphate CePO$_4$

S.U.Bhonsule[1, a], S.P.Wankhede[2] and S.V.Moharil[3]

[1]*Priyadarshini College of Engineering, Nagpur, India*
[2]*K.D.K.College of Engineering, Nagpur, India*
 3*Department of Physics, R.T.M. Nagpur University, Nagpur, India*
[a] S.U.Bhonsule: subhonsule@gmail.com

Abstract. This paper presents the preparation of CePO$_4$ and Yb doped CePO$_4$ using simple solid state reaction method. PL measurements indicated significant energy transfer from Ce^{3+} to Yb^{3+} ions. Further evidence of energy transfer was provided by analysis of Luminescence Decay measurements. Energy transfer efficiency of 50% was obtained for 5%Yb doping. Energy transfer from Ce^{3+} to Yb^{3+} ions takes place by Cooperative energy transfer mechanism. Such phosphors can be used in white LED's, Lasers and energy saving fluorescent lamps.

TRAJECTORY OPTIMIZATION TO THE HALO ORBIT IN FULL FORCE MODEL USING EVOLUTIONARY TECHNIQUE

Gaurav Vaibhav,* B S Kiran,† Dr. Kuldeep Negi,‡ Atiksha Sharma**
Saransh Shrivastava***

Aditya-L1 is the first conceived solar mission of Indian Space Research Organization (ISRO) in which the spacecraft will be placed in a non-planar periodic orbit (called halo orbit) around Sun-Earth L1 (SE-L1) libration point. This paper focuses on the mission design to the Sun-Earth L1 halo orbit considering the mission and launcher constraints. The mission design problem to the halo orbit broadly involves two major steps- Halo orbit design and selection and design of optimized transfer trajectory design to achieve the same, starting from Earth elliptic parking orbit (EPO). In this paper, the Halo orbit generation and transfer trajectory design have been initiated in CRTBP with backward propagation and its results have been fed to the developed full force model for the final design. Halo orbit selection is done considering mission and scientific requirements. Differential Evolution optimization algorithm has been developed as independent software to generate exact initial conditions for the halo orbit. Optimization of backward transfer trajectory design has also been carried out with the Differential Evolution. Transfer trajectory injection (TTI) ΔV, right ascension of ascending node (RAAN) and argument of perigee (AOP) obtained from the backward design were given as inputs to the forward trajectory design with full force model for propagation. The forward transfer trajectory was refined with full force model to achieve the desired Halo orbit insertion.

INTRODUCTION

The libration points are the equilibrium points of the circular restricted three-body problem (CRTBP). Euler and Lagrange proved the existence of five equilibrium points: three collinear points on the axis joining the centers of the two primaries, generally noted L1, L2 and L3, and two equilateral points noted L4 and L5. The Libration points are the locations that exist for every pair of two bodies such as Sun-Earth system or Earth-Moon system. A small body placed at the Libration point at zero velocity ideally experiences zero acceleration with respect to the two bodies. Thus, the body appears to be at rest as seen from either of the two primary bodies. Libration points offer many good properties. Spacecraft in the vicinity of these points are free of atmos-

* Scientist/Engineer 'SC', FDG, ISRO Satellite Centre, ISRO, Bangalore-560017, India
† Scientist/Engineer 'H', Division Head, FPD, ISRO Satellite Centre , ISRO, Bangalore-560017, India
‡ Scientist/Engineer 'SE', Section Head, TDFP, ISRO Satellite Centre , ISRO, Bangalore-560017, India
** Project Trainee 2015-2016 at ISRO Satellite Centre, ISRO, Bangalore-560017, India
*** Pursuing MS in Aerospace Engineering, Embry Riddle Aeronautical University, FL 32114, USA

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Abstract:
In this paper sensorless vector control of Induction motor (I.M.) using Model Reference Adaptive system (MRAS) is reviewed. Generally the performance of induction motor is poor at very low speed. It has significant effect on steady state and dynamic performance of the drive system. This can be improved by closed loop observer to estimate the state variables. MRAS is speed estimation method having two models namely reference and adaptive model. The error between two models estimates induction motor speed. MRAS is used to estimate the I.M. rotor speed and stator resistance and these are used as feedback signals for the field oriented control (FOC). The various closed loop observer are reduced order observer, kalman filter and sliding mode observer.

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Implementation of a New 7-Level H-Bridge Inverter Fed Induction Motor with Low Harmonic Values

¹Yogesh S. Bais, ²S.B. Deshpande and ¹S.P. Muley
¹Department of Electrical Engineering, Priyadarshini College of Engineering, Nagpur, India
²Department of Electrical Engineering,
Priyadarshini Institute of Engineering and Technology, Nagpur, India

Abstract: A multilevel structure with more than five levels can significantly reduce the harmonic content. The output voltage and power increase with number of levels. Adding a voltage level involves adding a main switching device to each phase. The goal here is to implement the seven level H-bridge inverter with less number of switches. The output of this circuit is fed to the induction motor. Using this scheme, we can control the speed and also reduce the noise and vibration of the induction motor. This research stresses on improving the efficiency of multilevel inverter and quality of output voltage waveform. A new seven level scheme is implemented with only seven switches. The MATLAB simulation is done and hardware is implemented by using IGBT's for the seven switches of seven level inverter.

Key words: IGBT, multilevel inverter, H-bridge, induction motor, vibration, hardware

INTRODUCTION

Multilevel converters can be applied to utility interface systems and motor drives. These converters offer a low output voltage THD and a high efficiency and power factor. There are three types of multilevel converters: diode clamped, flying capacitors and cascaded. The main advantages of multilevel converters include the following, Gobinath et al. (2013), Sekhar and Sekhar (2012), Bharath and Satputaley (2013), Kavousi et al. (2012), Napoles et al. (2013) and Kumar (2012):

- They are suitable for high-voltage and high current applications
- They have higher efficiency since the devices can be switched at a low frequency
- Power factor is close to unity for multilevel inverters used as rectifiers to convert ac to dc
- No Electromagnetic Interference (EMI) problem exists
- No charge unbalance problem results when the converters are in either charge mode (rectification) or drive mode (inversion)

The multilevel converters require balancing the voltage across the series-connected dc bus capacitors. Capacitors tend to overcharge or completely discharge at which condition the multilevel converter reverts to a three-level converter unless an explicit control is devised to balance the capacitor charge. The voltage-balancing technique must be applied to the capacitor during the operations of the rectifier and the inverter. Thus, the real power flow into a capacitor must be the same as the real power flow out of the capacitor and the net charge on the capacitor over one cycle remains the same (Gobinath et al., 2013; Sekhar and Sekhar, 2012; Bharath and Satputaley 2013; Kavousi et al., 2012; Napoles et al., 2013; Kumar, 2012).

Literature review: In the study of Gobinath et al. (2013), two types of methods or topologies have been compared, i.e., cascaded and reduced switches topology. Out of these two, this research uses reduced switches topology. In the study of Maheswari et al. (2012), Wanjekeche et al. (2012), Kumar et al. (2014) and Sathik and Romani (2014), the THD contents of 7-11 and 15 level cascaded multilevel inverters have been discussed. The total harmonic distortion depends on the switching angles for different units of multilevel inverters hence, the switching angles are calculated first by using Newton-Raphson method where some of harmonic components has been eliminated. Using the calculated switching angles, THD analysis is carried out analytically as well as using MATLAB simulation.

The study of Murugesan et al. (2012) demonstrates how the reduced harmonic distortion can be obtained for a new topology of multilevel inverters. The new topology has the advantage of its reduced number of devices

Corresponding Author: Yogesh S. Bais, Department of Electrical Engineering, Priyadarshini College of Engineering, Nagpur, India

DESIGN OF FIVE LEVEL INVERTER FED INDUCTION MOTOR USING PHASE SHIFTED CARRIER PWM TECHNIQUE

[1]YOGESH S. BAIS, [2]S.B.DESHPANDE, [3]S.P.MULEY

[1]Ph.D. Scholar, Electrical Dept., Priyadarshini College of Engineering, Nagpur, Maharashtra, India
[2]Professor in Electrical Engg. and Dean R & D, Priyadarshini Institute of Engg and Technology, Nagpur, Maharashtra, India
[3]HOD, Electrical Engg. Dept, Priyadarshini College of Engg. Nagpur, Maharashtra, India

Abstract - Multilevel inverter is an effective and practical solution for increasing power demand and reducing harmonics of ac waveforms. Such inverters synthesize a desired output voltage from several levels of dc voltages as inputs. This paper analyses the performance of five level inverter using phase shifted carrier PWM technique. It has been found that this technique reduces the switching losses and total harmonic distortion. The performance being analyzed by the SimPowerSystems in Matlab-Simulink and hardware being prepared using IGBT as a switching device and a microcontroller for Gate pulses.

Keywords - Multilevel inverter, carrier phase shifted PWM Technique, IGBT, Induction motor, Simulink.

I. INTRODUCTION

Over the past two decades, multilevel inverters have attracted wide interest both in the scientific community and in the industry. The reason for the increased interest is that the multilevel inverters are a viable technology to implement.The use of a multilevel inverter to control the frequency, voltage output (including phase angle), and real and reactive power flow at a dc/ac interface provides significant opportunities in the control of distributed power systems.

II. MULTILEVEL PWM INVERTER

The multilevel PWM inverters include an array of power semiconductors and capacitor voltage sources, the output of which generate voltages in stepped waveform. The commutation of the switches allows the addition of the capacitor voltages which reaches the high voltage level at the output, while the power semiconductors withstand only with reduced voltage.

TYPES OF PWM TECHNIQUES:
Multi level inverter is simulated for various multicarriers based pulse width modulation (PWM) techniques for a resistive load.
The PWM techniques include:-
1. Phase Opposition Disposition (POD) PW
2. Alternative Phase Opposition Disposition (APOD) PWM
3. Phase Shift PWM (PSPWM)
4. Phase Disposition (PD) PWM
5. Carrier Overlapping PWM (COPWM)
6. Variable Frequency PWM (VFPWM)
The power PWM inverter generates an output voltage with five values (levels) with respect to the negative terminal of the capacitor.

The concept of multilevel inverter control has opened a new possibility that induction motors can be controlled to achieve dynamic performance equally that of dc motors. The performance of the multilevel inverter is better than a classical inverter.

1. Phase Opposition Disposition (POD) PWM:-The carriers above the zero reference are in phase but shifted by 180° from those carriers below the zero reference.
2. Alternative Phase Opposition Disposition (APOD) PWM:- Each carrier band is shifted by 180° from the adjacent bands.
3. Phase Disposition (PD) PWM: - All the carriers are in phase.
4. Phase Shift PWM (PSPWM):- All carrier signals have the same amplitude and frequency but they are phase shifted by 90 degrees to each other.
5. Carrier Overlapping PWM (COPWM):- All carriers with the same frequency and same peak to peak amplitude are disposed such that the bands they occupy overlap each other.
6. Variable Frequency PWM (VFPWM):- Carriers have the variable frequency and same amplitude each other

III. CASCADED MULTILEVEL INVERTER

A cascaded multilevel inverter made up of from serious connected single full bridge inverter each with their own isolated dc bus. This multilevel inverter can generate almost sinusoidal waveform voltage from several separate dc sources, which may be obtained from solar cells, fuel cells, batteries, ultra capacitors, etc.This type of converter does not need any transformer or clamping diodes or flying capacitors. Each level can generate five different voltage outputs $+2V_{dc}$, Vdc, 0, $-2V_{dc}$ and $+V_{dc}$ by connecting the dc sources to the ac output side by different combinations of four switches. The output

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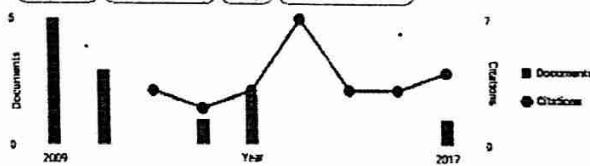
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Prediction of Multiple Sclerosis in Brain MRI Images using Hybrid Segmentation

S.P.Washimkar
Research Scholar
Electronics & Telecommunication Engg. Deptt,
PCE, Nagpur
Email:spwashimkar@gmail.com

S.D.Chede
Professor
Electronics & Telecommunication Engg. Deptt,
Suryodaya college of Engg., Nagpur
Email: santoshchede@rediffmail.com

Abstract- Multiple Sclerosis is a brain disease that forms the number of lesions in white matter of brain as the disease progresses. In this paper texture analysis is done on brain MRI Images of real data of patients to observe the progress of disease by detection. The objective of this paper is to find the progression detection by utilizing the segmentation and feature extraction techniques .The image is segmented using the AM-FM segmentation, the filtering is done by using Saliency map method and these filtered segmented features are clustered using Fuzzy C means clustering method. The paper also proposes an adaptive iterative threshold based algorithm for detection of lesion from the clustered image. The detected features are extracted using feature extraction techniques such as morphological, local binary pattern, mean and standard deviation methods. These extracted features are classified using K-NN classifier. The experimental results obtained are efficient and provides an accuracy of 97% which helps in accurately predicting a disease. Along with detection and classification the patch based algorithm is used for reconstructing the damaged images.

Keywords—Magnetic Resonance Imaging (MRI), Amplitude-Modulation, Frequency-Modulation (AM-FM), Multiple Sclerosis (MS) Silencing Map Detection, Fuzzy C-Means Clustering (FCM)

I. INTRODUCTION

The central nervous system consists of two components gray matter and white matter. The brain disease multiple sclerosis appears in brain white matter and spinal chord. It appears due to damage of myline shealth of nerve fibers This further develops no. of multifocal lesions in the central nervous system which relates with the disease progression.

Due to formation of lesions, volume of white matter shrinkages [1]. Multiple sclerosis (MS) normally appears in the age between 20-50 years and it affects more to women than men. The initial diagnosis based on clinical signs and symptoms is done by specialized neurologist [2]. McDonald criteria are followed by neurologist to see the disease progression with EDSS score. Several preclinical tests are helpful in disease verification. Magnetic Resonance Imaging (MRI) is one of the techniques to see the multifocal lesions in central nervous system. This relates to MS with the use of T2 weighted images. But still 5% patients who have been confirmed to have MS based on other criteria cannot observe in MRI. To cater this drawback, a texture analysis method is applied on multiple sclerosis in brain MRI images. Texture features can be significantly used to differentiate between normal and abnormal tissues. To avoid the intensity variation between successive scans of MRI, intensity normalization is applied on brain MRI [3]. The multiple image segmentation and feature extraction technique has been used to find the region of interest and lesion features in order to detect the disease in its initial stages. It will also be useful to see the progression of disease. The detection of disease in earlier stages helps to predict the type of disease with the patient might be suffering.

II. MRI DATASET

The dataset of normal brain MRI images and real patient brain MRI images carrying MS is collected from reputed hospital with reference from Radiologist and Neurologist. The data of 20 patient images in the age between 20 to 45 of both men and women have been taken. Out of the total Dataset some cases are identified as of progressive weeks and some are of initial stages.

III. REVIEW OF RELATED WORK

Yunyan Zhang (2012) describe that texture analysis is an image post processing approach that extracts quantitative information from a digital image based on mathematical analysis. A two dimensional MR images is a digitized picture of elements (pixels) characterized by spatial location and gray level intensities. MRI texture analysis evaluates the organizational pattern of image pixels. Texture features are in fact mathematical parameters that highlights the distribution of gray level intensities to reflect the structural regularity of image tissues [4]

Jing Zhang, Lei Wang, Longzheng Tong(2007) focuses on application of texture analysis on MR images which extract the classical texture analysis features to differentiate between normal appearing white matter(NAWM), normal white matter(NWM) and MS. The study demonstrates an accurate texture classification. It is high between MS lesion and NAWM also the classification is low between NAWM and NWM due to differences in selected features [5].The classification rate mentioned is 90%.

Victor Murray, Eduardo S.Barriga, Peter Soliz, Marios S. Pattichis focuses on the use of AM-FM method in series of medical Imaging problems ranging from ultrasound to retinal

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Implementation of safety alert system for elderly people using multi-sensors

3

Author(s)

∨ Neha R. Singh ; ∨ P. R. Rothe ; ∨ A. P. Rathkanthiwar   View All Authors

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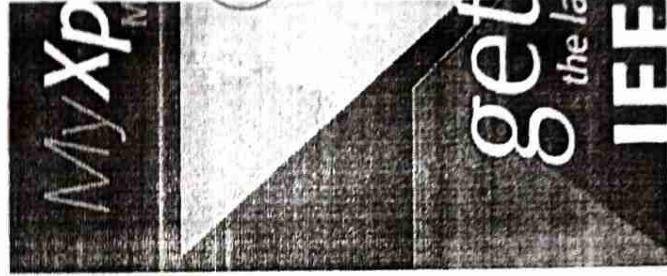
Abstract:

The fall-detection systems are used to create a reliable surveillance system for elderly people. In this paper an enhanced fall detection system with higher accuracy, sensitivity and specificity is proposed for elderly person monitoring. It is based on smart sensors that are worn on the body and operating through consumer home networks. With treble thresholds, accidental falls can be detected in the home healthcare environment. By utilizing information gathered from an accelerometer, cardiotachometer and smart sensors, the impacts of falls can be logged and distinguished from normal daily activities.

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Abstract:
The fast development of wireless sensor networks has made a chance to accumulate and remove enormous measure of data from Wireless Sensor Networks. WSN is efficient instrument that empowers its clients to nearly screen, comprehend and control application handle. WSN consist of huge number of heterogeneous sensor hub spread over the extensive territory and help for wireless sensing and data processing. Information administration and handling for wireless sensor networks (WSNs) has turned into a theme of dynamic research in few fields of software engineering, for example, the dispersed frameworks, the database frameworks, and the information mining. A wireless sensor network is made out of countless and sensors and hubs. These sensors hubs have a few limitations like data is highly resource constraints, huge in volume. Because of their asset limitations, traditional information mining strategies are not reasonable to WSN. This inspires to outline a novel and proficient information digging procedures for WSN. In this paper diverse existing information digging procedures for WSN are studied and some

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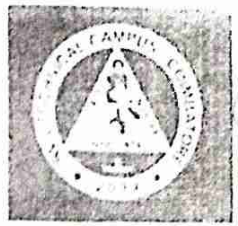
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Implementation of Parallel Multiplier-Accumulator using Radix-2 Modified Booth Algorithm and SPST

Ms. Deepali P. Sukhdeve[1] and Mr. C. N. Bhoyar[2]

[1]Ms. Deepali P. Sukhdeve, Mtech IV Sem (Electronics Engineering) Yeshwantrao Chavan College of Engineering Nagpur, India

[1]deepali.sukhdeven@rediffmail.com

ABSTRACT

In this paper we analyze a multiplier-and-accumulator unit (MAC) for high speed and less power consumption. Radix-2 Modified Booth Algorithm is used which reduces the partial products and improves speed. Carry Save Adder adds the 8 partial products and generates final three intermediate operands. Two of them are given as inputs for final addition that produces output of MAC unit from MSB 16-bit Result. Pipelining scheme is used which helps to improve the overall performance. Thus improving the speed. For reducing the power consumption, we need to reduce the glitches and spikes. The adder designed using Spurious Power Suppression Technique is used to remove the glitches and spikes. This SPST adder is applied to the modified Booth Encoder and the performance of multiplier-and-accumulator unit designed using CSA is compared with the multiplier-and accumulator unit designed using Spurious Power Suppression Technique (SPST).Both the architectures are synthesized using Xylinx ISE. The SPST MAC gives the superior results as compared to the MAC designed using CSA in terms of area, delay and speed and hence improves the overall performance.

Index Terms— Carry Save Adder (CSA), multiplier-and-accumulator (MAC), digital signal processing (DSP), spurious power suppression technique (SPST), Radix-2 Modified Booth Algorithm.

I. INTRODUCTION

In computing, especially digital signal processing, the multiply–accumulate operation is a common step that computes the product of two numbers and adds that product to an accumulator. The hardware unit that performs the operation is known as a multiplier–accumulator (MAC, or MAC unit); the operation itself is also often called a MAC or a MAC operation. The MAC operation modifies an accumulator a:

$$a \leftarrow a + (b \times c) \qquad (1)$$

When done with floating point numbers, it might be performed with two rounding's (typical in many DSPs), or with a single rounding. When performed with a single rounding, it is called a fused multiply–add or fused multiply–accumulate.Modern computers may contain a dedicated MAC, consisting of a multiplier implemented in combinational logic followed by an adder and an accumulator register that stores the result. The output of the register is fed back to one input of the adder, so that on each clock cycle, the output of the multiplier is added to the register. Combinational multipliers require a large amount of logic, but can compute a product much more quickly than the method of shifting and adding typical of earlier computers. The first processors to be equipped with MAC units were digital signal processors [1], but the technique is now also common in general-purpose processors. Some digital signal processors also use discrete cosine transform (DCT) or discrete wavelet transform.

A multiplier commonly uses an array of Full Adders and Booth's algorithm [2].It also uses Wallace Tree[4] instead of Array of full Adders. Such multipliers consists of Booth Encoder, Wallace tree and Final Adder[2],[4].A new architecture of MAC for high speed arithmetic is been proposed by Young-Ho Seo and Dong-Wook Kim. In this architecture multiplication is combined with accumulation and CSA is devised to improve the performance. The architecture proposed in [2] had a better performance compared to the previous MAC architectures. This architecture proposed in [2] can be adapted to various fields requiring high performance such as the signal processing areas. There is a need to reduce the power consumption due to the unwanted glitches and spikes.

In this paper, a multiplier-and-accumulate (MAC) unit will be designed for high speed and low power consumption. A 16 bit CSA tree is proposed to improve the output rate. The CSA tree uses Radix-2 Modified Booth Algorithm. A Carry Look Ahead Adder can be used to improve speed by reducing the amount of time required to determine carry bits.

In general a multiplier can be divided into three operational steps. The first step includes generation of partial products. The second step includes compression of partial products and the last is the final addition in which the result is produced by adding the sum and the carry. If we need to accumulate the results the operation consists of four steps.