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A Review on Antimicrobial and Antioxidant Properties of Anisomeles malabarica

Mohammad Athiq, Abhishek B, Saranya D, Prashanth Kumar HP, Rohit K C

Abstract

Anisomeles malabarica also known as Malabar catmint is an undershrub which belongs to Lamiaceae family. Found in tropical regions, this plant has an ancient origin of being both anti-microbial and anti-oxidant in nature. The plant extract of this plant can efficiently treat certain diseases like swelling, rheumatism and mild fever. The plant is initially subjected to phytochemical analysis to check the presence of metabolites. Anti-microbial property is made evident by employing agar well diffusion techniques and radical neutralization method is employed to check the anti-oxidant property. Based in the results of these analytical methods the plant can be used in air and water filters for efficient treatment of microbes. The anti-oxidant property can also be used to minimize the effect of smoking on the human body.

Keywords: Anisomeles malabarica, anti-microbial, anti-oxidant, air filters

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A REVIEW ON NANO BIOSENSORS AND ITS APPLICATIONS

Abhishek B, Athiq M, Saranya D

ABSTRACT

Nanotechnology plays an important role in the development of new class of biosensors known as nanobiosensors. The performance and sensitivity of biosensors are improved by using nanomaterials through new signal transduction technologies. The design of biosensors has greatly witnessed significant alterations in the recent days. Firstly, biosensor is a device which converts biological responses in diverse range of applications in many fields like food quality assurance, environmental monitoring, clinical applications, diagnostic applications etc. Nanobiosensors commonly comprise of biological recognition molecule immobilized onto the surface of a signal transducer. The development of process and tools used to fabricate and image nanoscale objects has led the interaction of sensors with extremely small molecules which need to be analyzed. Nanotechnology has best exciting ingredients for the improvement of sensing phenomenon. The use of wide varieties of nanomaterials ranging from nanoparticles, nanowires, nanorods, and nanowires has drastically boosted the specificity of the detection system, and its reproducibility in much better way. This paper reviews the various nanostructure based biosensors and their applications.

Keywords: Nanotechnology, nanobiosensor, biological recognition

Cite this Article

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Review Paper

A review on scaffolds used in tissue engineering and various fabrication techniques

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Abstract

Developments in the field of tissue engineering has replaced the earlier practice of allograft transplantation by modern approaches like tissue engineering using scaffolds. This has eliminated the occurence of GVHD, which generally occurs in patients who have received tissue grafts. Scaffolds can be fabricated from various materials like hydrogels, natural polymers, hydroxapatite, etc, depending on the tissue to be engineered. They can be engineered using various techniques such as rapid prototyping, electrospinning, etc. Scaffolds of appropriate porosity, fabricated from biocompatible materials can increase the efficiency of cell proliferation. Scaffolds have been used in the fabrication of bone ,cartilage, muscle, neural and skin tissues. They can be seeded with various types of cells such as fibrobalsts, osteoblasts, etc depending on the tissue of interest.

Keywords: graft, polymer, proliferation, scaffolds.

Introduction

The human body consists of a number of tissues which are masses of cells which perform specific functions. They can be of various types such as muscular, epithelial, nervous, connective, etc. They act as building blocks of various organs. These tissues stop functioning normally when they are damaged due to injury, ageing or disease. The damaged tissue has to be replaced to ensure proper functioning of the respective organ. For example, the skin which is responsible for innate immunity of the body by protecting it from harmful microorganisms, chemical substances, etc. can be damaged by disease, burns and other accidents. The damaged skin has to be replaced by healthy skin cells to ensure effective defence against pathogens.

The conventional methods involve tissue transplant which is classified into various types [1] autografts, which involve replacement of the damaged tissue of an individual by healthy tissue from the same individual, allografts, which involve replacement of the damaged tissue by healthy tissue from a non identical individual of belonging to the same species, xenografts, which involve replacement of the damaged tissue by healthy tissue from an organism belonging to a different species and isografts, which involve replacement of the damaged tissue by healthy tissue from an organism which is genetically identical and from the same species.

The number of limitations associated with these methods exceeds the number of benefits. Firstly, the probability of acceptance of these grafts especially allografts and xenografts is very low. The acceptance of a graft is governed by MHC (Major Histocompatibility Complex) [2] which is a protein located on the cell membrane. This complex is called HLA (human leukocyte antigen) in human beings. A graft is accepted if the MHC/ HLA of the donor matches with

Power Generation from Kitchen and Industrial Waste Water using Microbial Fuel Cells (MFCs) with Graphite Cathode and Anode

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Abstract

Degradation of fossil fuels and increased accumulation of waste water has become the major issue in the world over decades. Microbial fuel cells are one such advancement that makes use of renewable waste sources like dhobi ghats, pond water, domestic kitchen waste water and industrial waste water; and directly convert it into electricity. Microbial fuel cells are electrochemical cells that directly convert chemical energy into electrical energy using microorganisms as a biocatalyst. The two chambered or the H configuration MFC's were used to carry out the voltage studies. Agar medium was used as a salt bridge for the transfer of free electrons from the anode to cathode. Graphite rods were chosen as anode and cathode due to its amorphous nature. SEM analysis was done to check the morphological structure of graphite rods before and after introducing into the MFC's and observed for scaling. The voltages created across the electrodes were tabulated, initially without any substrate observed over a period and later with substrate, the readings thus obtained were compared for increase in voltage created by the waste water considered. The current and power generated by MFC's were evaluated using ohms equations. The power generated was then stored into rechargeable batteries.

Keywords: Microbial fuel cell (MFC's), physical, waste water, electrodes, substrates, graphite, voltage, current

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INTRODUCTION

Significantly every year the global energy demands have increased on fossil fuels; which is unsustainable due to finite supplies from environment. Fossil fuels cause pollution and global warming. A very good alternative for fossil fuel is fuel cells. A basic fuel cell is an electrochemical cell that converts chemical energy from a fuel to electrical energy. In a fuel cell, an oxidation reaction occurs at the anode generating electrons that transfer to the cathode through the external circuit and a reduction reaction occurs at the cathode. These fuels are a good source of renewable form of energy from the waste generated by industries, domestic and agriculture. Numerous efforts have been made to develop different power sources alternatives that are capable of performing in physiological conditions for prolonged lifetime without recharging. In 1791 the earliest discovery between biology and electrical energy was demonstrated by Galvani showing the frog leg twitching from an electric current [1]. Grove in 1839 discovered the first fuel cell, which involved electrolysis of water. Using the microorganism (E.coli) Potter at University of Durham demonstrated the first half-cell [2]. Cohen from University of Cambridge led to one of the major types of biofuel cells, i.e., microbial fuel cells which were connected in series and generated over volts [3]. Development of biofuel cells received a boost in the late 1950s and early 1960s by the USA space program, which led to application of microbial fuel cells as an advanced technology for waste disposals treatment in space flights. Microbial fuel cells were widely applied since 1970s by the concept of using them as biocatalyst [4, 5]. And they also found that by using electron mediators the power output could greatly be improved [6–8]. The instability and toxicity of

REVIEW ARTICLE

BIOACCUMULATION OF HEAVY METALS BY FUNGI

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Abstract: Increased industrial activity and demand for heavy metals like copper, lead, mercury, manganese, zinc cadmium and many more has increased the global quantity of heavy metal contaminated wastewater. Current technologies employed to remove metals present in low concentration from waste water through the process like precipitation and ion exchange are often expensive and inefficient. The need for an inexpensive and efficient system has generated interest in the study of biosorption and bioaccumulation processes in fungi as possible systems for metal removal.It is one of the future challenges of environmental biotechnology for metal winning process which are based on closed cycle carried out with ecologically sustainable techniques.

INTRODUCTION

Interaction of toxic electronics waste with fungi has been an important environmental context which is accelerating the natural environment pollution which is of prominent interest because of presence of dominant fungi in metal polluted habitats. The translocation of toxic metals and radionuclides into fruit bodies of edible higher fungi and its significance in the amelioration of metal toxicity, and also the use of fungal biomass for the detoxification of metals or radionuclide containing industrial effluents which can be considered as "Biotechnological Potential".(1,3) Fungi are mainly associated with the production of antibiotics, enzymes and organic acids till today. The ability of the fungi to solubilize great amount of metals from solid materials is the new prospects for the application of fungi. Fungi contribute in detoxification of heavy metals contaminated wastes like sewage sludge

and coal wastes. Pyrometallurgical methods are carried out for further application.(4) bioaccumulation also know as passive metal uptake, is metabolism independent uptake of metals by living and non-living biomass. Fungal cell wall contains several functional groups, including carboxyl, amine, hydroxyl, phosphate and sulfhydryl groups. These functional groups act as ligands and confer the ability to chelate metal ions.

ROLE OF DIFFERENT ISOLATES OF FUNGI ON HEAVY METALS

The tolerance to and bioaccumulation of selected heavy metals by filamentous fungi, as a result of natural adaption and improved resistance of fungal cells. Inhibition of biomass production is confirmed in Thirty-nine ectomycorrhizal fungi isolates of paxillus involutus, pisolithus tinctorius, suillus bovinus, s. luteus and s. variegates when tested on heavy metals like cadmium, copper, nickel and zinc amended media at in-vitro tolerance condition(2)White-rot fungi require trace amount of essential heavy metals such as Cd, Mn or Zn for their growth, but these heavy metals are toxic when present in excess. Toxic heavy metals can inhibit the growth of Basidiomycetes and can cause morphological and physiological changes and effect the reproduction. Fungal species and strains differ in their sensitivity and the protection mechanism towards the heavy metals.during the degradation of metals by white rot fungi or isolated enzymes,heavy metals interfere with both the activity of extracellular enzymes involved in the process and fungal colonization.(5)When compared heavy metal polluted site and non-contaminated soils, there was the significant interspecific variation, such asin twenty one isolates were observed in metal tolerance. S.luteus, S. variegates and P. tintorius were more tolerant of Cu, Cd, and Zn when compared with P. involutus, whereas the reverse was true for Ni. A high intraspecific hrterogenity in metal tolerance was also found.EC50values for isolates originating from polluted sites and non contaminated sites werenot statistically different. (6)

Aspergillustereus, Cladosporium cladosporioides, Fusarium oxysporum, Gliocladiumroseum, Penicillium spp., Talaromyceshelicus and Trichoderma koningii were isolated from heavily polluted industrial area of La Plata, Argentina. The fungi were obtained from the sediments with 0.25-0.50 mg cd/l and they were isolated in cadmium- basal medium. And they were cultivated to evaluate their cd detoxification abilities. About 5-53% of the yield of stirred cultures biomass was developed in static assays for different fungal species, although the cadmium absorption was similar in both the cases. These fungal species could be used in remediation biotechnology to improve the cd detoxification of chronically contaminated habitats. (7) Ericod mycorrhizal fungi can allivate heavy metal toxicity to their host plant. The characterisation of two isolates of Oidiodendron majus from mycorrhizal roots of Vaccinium

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Dye Sensitized Solar Cells: The Emerging Technology

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Abstract - Dye sensitized solar cell (DSSC) have unique properties of organic and inorganic compound, it is technically and economically different alternative of photovoltaic devices. In DSSCs the two functions are separated i.e. light absorption and charge carrier transport. Light is absorbed by the photo sensitizers and the photons emitted are injected in to the TiO2 film. Dye molecule become oxidized, and it regenerated again by receiving the electrons from the redox ion mediator present in electrolyte.DSSCs are cost effective, nontoxic and work in low light conditions. Harvest more sunlight compared to commercial photovoltaic technologies (crystalline and amorphous silicon, CdTe, or copper indium gallium selenide. This review presents the current state of the field, new concepts of the DSSCs inclusive of hetero junction variants to analyze the futureperspectives for development and current technology.

Keywords - DSSC, Solar cells, TiO_2 film, Dye sensitizer

1. Introduction

A dye-sensitized solar cell (DSSC) is a cost-effective group of thin film solar cells which is based on a semiconductor formed between a photo-sensitized anode and an electrolyte [1]. It has a number of attractive features such as it is simple to construct employing conventional roll-printing techniques. It is semi-flexible and semi-transparent offering a wide number of usability options. In practice it has proven difficult to eliminate platinum and ruthenium in its manufacturing but its usage in all-weather still remains under question. The quantitative conversion of incident photon into electric current is achieved over a large spectral range extending from the ultraviolet to the near Infra-red region. Although its conversion efficiency is less, the ratio to its price to performance is proven to be good enough to allow it to compete with fossil fuel electrical generation [2]. DSSCs provide a technically and economically convincing substitute concept to present day p–n junction photovoltaic devices. The function of light absorption and charge carrier transport is separated here. Light is absorbed by a sensitizer which is anchored to the surface of a wide band semiconductor. The separation of charge takes place through the photo-induced electron injection from the dye into the conduction band of the solid at the interface. Carriers are transported in the conduction band of the semiconductor to the charge collector. The sensitizers having a broad absorption band permits to harvest a large fraction of sunlight [3]. DSSCs split the two functions provided by silicon in a conventional cell design. Normally the silicon acts as both the source of photoelectrons, as well as a provision to separate the charges resulting in the electric field. Here the photoelectrons are provided from a separate photosensitive dye and the bulk of the semiconductor is used only for charge transport. The separation occurs at the surface between the dye, electrolyte, and semiconductor [4]. Dye sensitizer absorbs the incident sunlight and exploits the light energy to induce vectorial electron transfer reaction. It is not sensitive to the defects in semiconductors, easy to form and supports direct energy transfer from photons to chemical energy. The earlier photo electrochemical studies of dye sensitization of semiconductors focused on flat electrodes, but these systems were facing an intrinsic problem. Only the first monolayer of adsorbed dye results in effective electron injection into the semiconductor, but such light-harvesting from a single dye monolayer is extremely small. By application of nanoporous TiO_2, the effective surface area can be enhanced 1000-fold. An intriguing feature in the nanocrystalline TiO_2 film is that the charge transport of the photo-generated electrons passing through all the particles and grain boundaries is highly efficient. Solar cell based on a dye sensitized porous nanocrystalline TiO_2 photo anode with attractive performance was first reported by Gratzel et al. Interest in nanoporous semiconductor matrices permeated by an electrolyte solution containing dye and redox couples has been stimulated by their reports. The power conversion efficiency of the DSSC has been currently improved to 11.5%. Since the first DSSC was reported with efficiency of 7.1% comparable with the amorphous Silicon cells. Large-size DSSC has been prepared on silver grid embedded fluorine-doped tin oxide (FTO) glass substrate by screen printing methods. In DSSC, the initial photo excitation occurs in the light absorbing dye. Nanoporous semiconductors such as TiO_2 not only act as support for dye sensitizer but also function as electron acceptor and electronic

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THE CHARACTERISTICS, TOXICITY AND EFFECTS OF CADMIUM

Honey Sharma, Neetu Rawal, Blessy Baby Mathew*

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ABSTRACT

Cadmium is a heavy metal that occurs as a natural constituent in earth's crust along with Copper, Lead, Nickel and Zinc. Cadmium is vastly used in batteries, coating, plating, alloys etc. in various industries. Humans are commonly exposed to cadmium by inhalation and ingestion. Cadmium enters in air and bind to small particles where it can combine with water or soil causing contamination of fish, plants and animals in nanoform. Spills at hazardous waste sites and improper waste disposal can cause cadmium leakages in nearby habitats. Foodstuffs like liver, mushrooms, shellfish, mussel, cocoa powder and dried seaweed are cadmium rich increasing the concentration in human bodies. Cigarettes contains tobacco smoke that transports cadmium into lungs and then to the rest of the body through blood. The bioaccumulation of cadmium in human body and in food chain leads to acute and chronic intoxications due to biomagnification. Health effects includes diarrhea, stomach pains, Bone fracture, Reproductive failure and possibly even infertility, damage to the central nervous system and immune system, psychological disorders, etc. Cadmium can also cause the transformation of normal epithelial cells into carcinogenic cells by inhibiting the biosynthesis of protein. Cadmium waste streams from the industries end up in soil which can pollute both soil and surface water. The organic matter in the soil absorbs cadmium increasing the risk of survival of various plants and also increases the uptake of this toxic metal in food. This review is about the study of toxicity mechanism of cadmium in human beings and plants and the biological phenomena involved.

Keywords: Cadmium ion, cadmium induced toxicity, cadmium related diseases

INTRODUCTION

Cadmium (Cd) is a silvery-white, soft, ductile chemical metal with atomic number 48 and belonging to the group 12 element in d block and period 5. It was discovered by German chemist F.Strohmeyer in 1817 as a constituent of smithsonite ($ZnCO_3$) from zinc ore. Electronic configuration of the cadmium is [Kr] 4d10 5s2. Cadmium concentration in the earth crust is 0.15ppm and the most common cadmium mineral is greenockite (CdS).[1] Cadmium is recovered as a by-product from sulfide deposits, mainly those containing lead, zinc, and copper. Cadmium level in human increases with the age, it reach to an average of about 30mg in the age range 40-50 and after that decreases slightly. [2] Cadmium is hazardous to both environment and human beings. Cadmium present in atmosphere, water, or food when exposed to human in low concentration

cause serious health problems and probably the death.[1] Sources of cadmium human exposures are fossil fuels, iron and steel production, cement nonferrous metals production, waste incineration, smoking, fertilizers, etc. Activities like volcanic eruption, mining and use of phosphate fertilizers provides cadmium exposures indirectly as toxin from earth crust. Plants take up cadmium from the soil and form the major source of cadmium intake in non-smoking, non-occupationally exposed populations. There is a significant use of this heavy toxic metal in batteries, pigments, coating, plating, PVC stabilizers and alloys in industries. [3]Renal disease and emphysema are observed in the workers working in battery plant due to the inhalation of the cadmium oxide dust over a long period of time. Due to excessive intake of cadmium in water and rice and low intake of calcium and vitamin D, there is effect in pregnancy and lactation. Cadmium in small amount absorbeKd in the kidney cause proteinuria when kidney concentration reaches a certain value. Interaction between Cd, Cu and Zn results in cadmium toxicology [4]. Cadmium is also adsorbed

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The Importance, Extraction and Usage of Some Floral Wastes

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Abstract - In most of the developing countries like India, the floral waste generation occurs largely during functions, worships, ceremonies, festival etc. Degradation of floral waste is very slow process but it causes cell and worm development at the sites. Floral waste degradation also increases the demand for agro-based products. Solid wastes comprise of various organic and inorganic materials, covering or peels of various vegetables, fruits and cooked materials. It facilitates the proliferation of various group of microbial flora, which may be pathogens. The fertilizers are used to improve the fertility of the land using biological wastes. The present review deals with the various extraction methods of floral wastes. It results outcomes in the form of different useful products and its importance in various fields.

Keywords - Floral waste, Degradation, Proliferation, Bio-fertilizers, Vermicomposting

1. Introduction

Huge amounts of flowers are offered in temples in India creating a large amount of flower waste. The temple wastes are released in the water bodies or dumped at the available places of land which creates severe environmental pollution and health hazards. Many studies have also emphasized on the importance of N, P and K in enhancing the natural ability of plants to resist stress from drought and cold, pests and diseases (Debosz et al., 2002; Cao et al., 2007). Essential plant nutrients such as N, P, K, Ca, Mg and S are called macronutrients, while Fe, Zn, Cu, Mo, Mn, B and Cl are called micronutrients. It is necessary to assess the capacity of a soil to supply the lacking amounts of needed plant nutrients. This is also important to produce a good bio-fertilizer formulation and to supply nutrients that can improve soil health and fertility of plant. Most of the floral wastes are nowadays used with cattle and human wastes in order to act as organic manures with the help of vermicomposting. This process helps to minimize the decomposition rate (Shouche et al., 2011; Aligiannis et al., 2001). Floral wastes can obtained as fruits, leaves, stem, bark, flower petals and root fibres etc. These floral components of the plants can be widely used in commercial and domestic backgrounds considered as organic in nature.

2. Role and Importance

Anti-microbial activity: The essential oils like carvacrol, terpinen-4-ol, linaloolo, sabinene,α-terpinene, and γ- terpinene are obtained from the aerial parts of *Origanumscabrum* and *Origaummicrophyl*, oils obtained from these organism exhibits a good profile of antimicrobial activity (Aligiannis et al., 2001). *Rosmarinusofficinalis*also plays an important role in antimicrobial activity mainly contains 2, 2-diphenyl-2-picrylhydracyl hydrate (DPPH). Rosemary extracts showed a high radical scavenging activity. Methanol extract containing 30% of carnosic acid, 16% ofcarnosol and 5% of rosmarinic acid was the most effective antimicrobial against Gram positive bacteria (Jadhav et al., 2013; Moreno et al., 2006). *Rosmarinusofficinalis*is used for the extraction of oil which are tested against the three bacteria like *Pseudomonousaeruginosa, Staphylococcus aureus, Escherichia coli* for antimicrobial activity (Bedin et al., 2009).

Anti-inflammatory activity: The species *Achillea ageratum* is a plant of the mediterranean region, has been widely used in medicine mainly for anti-inflammatory activity in digestive disease. Besides the analgesic, antipyretic and inflammatory activities of choloroform contains terpenic compound mainly β-sitosterol and stigmasterol are more effective as topical anti-inflammatory agents in acute than in the chronic process and their action is markedly influenced by the inhibition of neutrophil migration into inflamed tissue (Gomez et al., 1999).

Common uses: Air fresheners are common commercial products used to create pleasant odour. Some air fresheners are proprietary blend of Vanillin (Vanilla), *Citrus Sinensis* Peel (Sweet Orange), *Artemesia Pallens* (Davana Flower), Citrus Grandis

Health effects caused by metal contaminated ground water

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Abstract

The main threats to human health are associated with the exposure to heavy metals like lead, cadmium, zinc, manganese, copper, nickel, chromium, mercury and arsenic. Even though adverse health effect due to heavy metals is known, still exposure continues the same in most of the developing countries. Cadmium found in low concentration in rocks, coal, and petroleum, enters the groundwater and surface water through industrial discharge, metal painting by which it replaces the zinc biochemically in the body and causes high blood pressure, liver and kidney damage and anemia. Cadmium emission is increasing dramatically as it is not recycled and often dumped along with the household waste. The general population is exposed to mercury through food; fish is the major source of methyl mercury exposure and dental amalgam. Lead enters environment from industry, mining and as a water additive; Affects red blood cell chemistry, delays normal physical and mental development in babies and young children, increase in blood pressure in some adults. In ground water used as drinking water, arsenic concentrations ranged from 0.1–1340 µg L^{-1}. Exposure to the arsenic is mainly through food and drinking water which has the high risk of cancer of lung, skin, bladder and kidney, skin lesions such as hyperkeratosis and pigmentation changes.

Keywords: heavy metals, health effects, metal toxicity

1. Introduction

Heavy metals constitute a very heterogeneous group of elements widely varied in their chemical properties and biological functions. Heavy metals are kept under environmental pollutant category due to their toxic effects on plants, animals and human being. Anthropogenic activities such as mining, smelting operation and agriculture have locally increased the levels of heavy metals such as Cd, Co, Cr, Pb, As and Ni in soil up to dangerous levels. Heavy metals have largest availability in soil and aquatic ecosystems and to a relatively smaller proportion in atmosphere as particulate or vapors. Several heavy metals are considered toxic metals due to adverse human health effects, when taken in excess.

Heavy metal toxicity in plants vary with plant species, specific metal, concentration, chemical form, and soil composition and pH, as many heavy metals are considered to be essential for plant growth few metals like Cu and Zn serve as the co-factor and activators for the enzyme reactions. Some of heavy metal such as Cd, Hg and As etc. are strongly poisonous to metal sensitive enzymes, resulting in growth inhibition and death of organisms. Heavy metals which are categorized as class B metals that come under non-essential trace elements, which are highly toxic elements such as Hg, Ag, Pb, Ni. These heavy metals are persistent, bio accumulative and do not readily breakdown in the environment or not easily metabolized. Such metals accumulate in ecological food chain through uptake at primary producer level and then through consumption at consumer levels. Heavy metals such as Cd, Ni, As and Cr pose a number of hazards to humans.

Heavy metals are also potent carcinogens. Mercury intake leads to mina Mata disease and Arsenic causes poisoning due to drinking water contamination. The essential heavy metals (Cu, In, Fe, Mn and Mo) play biochemical and physiological functions in plants and animals. Two major functions of essential heavy metals are: (a) Participation in redox reaction, and (b) Direct participation, being an integral part of several enzymes. Vapor form of heavy metals such as As, Cd, Cu, Pb, and Sn

Original Research Article   Biotechnology

PRODUCTION OF BIOETHANOL FROM AN AGRO WASTE, PROCESSED *ARECA CATECHU* WATER

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ABSTRACT

Bioethanol is a promising potential renewable energy to petroleum-derived transportation fuel. Ethanol can be produced from a variety of biological sources. Lignocellulosic biomass has been suggested as the most promising alternative for the traditional starch feedstock. Areca nut processed agro waste water is an attractive biomass for bioethanol production due to carbohydrate contents. The biochemical tests of Areca nut agro processed water showed the presence of more of cellulose in the raw material. Saccharification was better When the enzymes, cellulase and amylase were used for hydrolysis, than acid hydrolysis (23.5 mg/ml Glu). The bioethanol production revealed that SSF (Simultaneous Saccharification and fermentation) (11.6 g/L ethanol) process is better as compared to SHF (Separate Hydrolysis and Fermentation) process (9.25 g/L ethanol) in bioethanol production. First time we are showing that the Areca nut processed agro waste water is an attractive biomass for bioethanol production due to its higher carbohydrate contents.

KEY WORDS: *Areca catechu*, Bioethanol, Hydrolysis, Fermentation, Enzymes, Saccharification.

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Fatigue Analysis of A Panel Consisting Of Window Cutout and Frames in the Fuselage of A Transport Airframe

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Abstract - *Aircraft is a complex mechanical structure with a very high structural safety. Aircraft will rarely fail due to a static overload during its service life. As the aircraft continues its operation, fatigue cracks initiate and propagate due to fluctuating service loads. To ensure airworthiness of an aircraft during its entire economic service life, fatigue and damage tolerance design, analysis, testing and service experience correlation play a vital role. This paper deals with the problem of stress analysis of a fuselage panel. The panel consists of a window cutout and stiffeners on either side of the cutout. The maximum tensile stress location will be identified in the panel. MSC PATRAN and MSC NASTRAN will be used for the static stress analysis.*

In a structure like airframe, a fatigue crack will appear at the location of high tensile stress. Further these locations are invariably the sites of high stress concentration. Therefore, the first step in the fatigue design of an airframe is the identification of high tensile stress. This is facilitated by a local refined FEA. This is followed by an estimation of the local stress at the highest stress concentrator. In the second phase of this paper the problem of prediction of life to fatigue crack initiation under the constant amplitude service loads will be addressed.

Key Words:

1. Introduction

Aircraft is a complex mechanical structure with a very high structural safety. The major aircraft structures are Wings, fuselage, and empennage. The primary flight control surfaces, located on the wings and empennage, are ailerons, elevators, and rudder. These parts are connected by seams, called joints. All joints constructed using rivets, bolts, or special fasteners are lap joints. Fasteners cannot be used on joints in which the materials to be joined do not overlap - for example, butt, tee and edge joints. A fayed edge is a type of lap joint made when two metal surfaces are butted up against one another in such a way as to overlap.

The largest of the aircraft structural components, there are two types of metal aircraft fuselages: Full monocoque and semimonocoque. The full monocoque fuselage has fewer internal parts and a more highly stressed skin than the semimonocoque fuselage, which uses internal bracing to obtain its strength.

The full monocoque fuselage is generally used on smaller aircraft, because the stressed skin eliminates the need for stringers, former rings, and other types of internal bracing, thus lightening the aircraft structure.

The semimonocoque fuselage derives its strength from the following internal parts: Bulkheads, longerons, keel beams, drag struts, body supports, former rings, and stringers.

1.1 Bulkheads

A bulkhead is a structural partition, usually located in the fuselage, which normally runs perpendicular to the keel beam or longerons. A few examples of bulkhead locations are where the wing spars connect into the fuselage, where the cabin pressurization domes are secured to the fuselage structure, and at cockpit passenger or cargo entry doors.

1.2 Longerons and Keel Beams

Longerons and keel beams perform the same function in an aircraft fuselage. They both carry the bulk of the load traveling fore and aft. The keel beam and longerons, the strongest sections of the airframe, tie its weight to other aircraft parts, such as power plants, fuel cells, and the landing gears.

1.3 Drag Struts and Other Fittings

Drag struts and body support fittings are other primary structural members. Drag struts are used on large jet aircraft to tie the wing to the fuselage center section. Body

DEVELOPMENT OF ENERGY SAVING METHOD IN GAS HEATING USED FOR PRESSURE COOKER ON A GAS STOVE BY REDUCTION OF HEAT LOSSES

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ABSTRACT

This paper aims to present an experimental data which clearly establishes the possible energy and fuel savings in the conventional LPG stove heating abundantly used in cooking of foods. The heat losses occurring in pressure cooking by LPG gas stove configuration are measured. Few lay moulded and suitably configured insulation devices are used to reduce the heat losses. Using these designed insulating devices, the reductions in heat losses are measured. The results and analysis carried out indicate energy savings of ~5 to 10%. Taking into account the large quantity of LPG gas consumed everyday (~ 10 to 20 tonnes per day in Karnataka alone) this can lead to enormous savings in fossil fuel consumptions, as the fossil fuel resources are getting depleted gradually.

I. INTRODUCTION

Gaseous fuel such as Indane (LPG) gas is used abundantly for gas stoves in India in cooking (both for domestic and commercial establishments). Even a small percentage saving in consumption would lead to large fuel economy. LPG gas is a mixture of Butane and propane and has a calorific value of ~ 94 MJ/M^3

The gas stoves presently being used for cooking and pressure cooker used do not take care of certain heat losses that occur. This study was conducted as a part of Graduate level students Project work at Sapthagiri college of Engineering, Bangalore, Karnataka state.
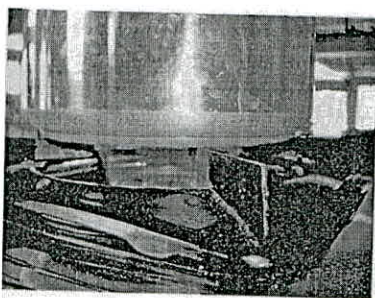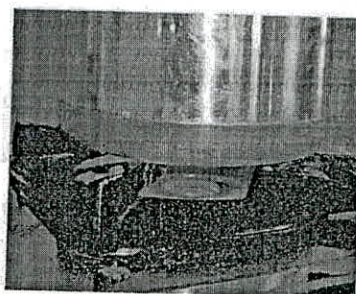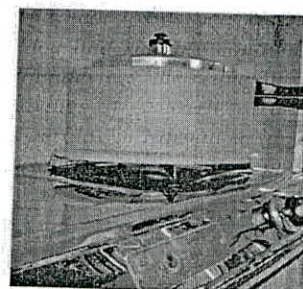
Fig. 1   fig.2   fig.3

Fig 1 shows an uncoated cooker in heating, **Fig 2** shows copper bottom cooker in heating **Fig 3** shows insulation mould around cooker in heating.

Biogas from Biodegradable Kitchen Waste

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This paper describes about production of biogas from biodegradable waste, an energy resource for the next generation in the upcoming future. The paper defines taking biogas production using kitchen waste into account, explains the need for biogas, and outlines the benefits of biogas, taking facts and figures into consideration. Biogas can be the future resources which are much more ecofriendly and safer to use, leading to a greener tomorrow. Today world is on the verge of major disaster due to the use of conventional fuels as primary fuels. In order to avoid it, it has become our top priority to come with such eco-friendly and flourishing alternative fuels which are available in abundance and easy to harness and can be used as primary fuels of future. This biogas plant can be replicated in an available smaller space and in advocate temperatures. It concludes that to increase the production of biogas from kitchen waste, rice waste should mix with cow dung in 3:2 ratio, with considerable lesser amount of other kitchen waste and also by maintaining the pH of 6.2-6.5. Calorific value is increased by passing the produced gas through scrubber. The calorific value which we obtained is 32.21MJ/kgk which good enough to reduce the requirement of LPG.

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Discovering Coherent Association Rules using Propositional Method

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Abstract— Another system for Information mining through which fascinating association rules called reasonable guideline can be found. Lucid guidelines are those rules that can be mapped to sensible comparability as per propositional method. In the event that positive intelligent standards are found, then nega-tive rational principles between the nearness and nonatten-dance of the same thing sets won't happen and the other way around. The pseudo ramifications of equivalences can be further characterized into an idea called Reasonable Guidelines. The disclosure of coherent rules from exchange records sort of dataset is called Market Basket Analysis. The proposed work provides a framework for discovering coher-ent rules offers a technique for data mining that overcomes the limitationsnassociated with existing methods and enables the finding of association rules among the presence and ab-sence of a set of items without a preset minimum support threshold.

Key words: Information Mining, Association Rule, Coherent Rule, Propositional Method, Minimum Support, Market Basket Analysis

I. INTRODUCTION

With the introduction of the PC, scientists were given the force and comfort to investigate and find intriguing and non-evident information from expansive databases. The procedure of getting this learning through the PC is known as Information Mining. The prominence and significance of information mining has its roots in two causes: the always expanding volume of in-formation and calculation power. The measure of data on the planet duplicates like clockwork. Business exercises, for in-stance, keep on producing an expanding stream of information which is put away in bigger and less expensive information stockpiling [1]. Meanwhile, the computational force accessible keeps on expanding. The result of the expanding volume of information and computational force is a chance to make information mining applications taking into account calculations to find intriguing learning from extensive volumes of information.

A. Market Basket Analysis

Various capacities are utilized as a part of information mining including, for instance, join examination, expectation and perception. A connection examination commonly finds the information of "what runs with what" and "what takes after what". The last is called arrangement investigation and recognizes a grouping of occasions, while the previous is known as fondness examination [2]. A case of fondness examination in the retail division is the Business sector Wicker container Investigation (MBA). Given an arrangement of retail exchange records, a MBA discovers relationship between the diverse things that clients place in their shopping market crate. A few things are frequently bought together and different things are most certainly not.

For instance, thing A is frequently acquired together with thing B. Finding these associations portrays clients' purchasing propensities. Knowing such associations helps a retailer to devise successful promoting techniques. An advancement to build the offer of any one thing inside an association could expand the offers of another thing.

One great way to deal with finding the examples that go together is by means of the backing and certainty system proposed by Agrawal, Imielinski and Swami. Utilizing this structure, designs that can be watched every now and again in an arrangement of exchange records are recognized. To distinguish these examples, the system requires a client to preset an edge that isolates as of-ten as possible watched designs from rare examples. This limit is known as a minimum support. Later, arrangements of things that have seemed together over this minimum support are looked. Decides that interface two arrangements of much of the time watched things that have seemed together over a support are found and a second measure of interestingness, for example, certainty [3].

B. Motivation

Finding a complete arrangement of association rules in infor-mation mining. The unfavorable impacts of settling on choice taking into account deficient data can be exorbitant to an association. The unfavorable impacts are an outcome of the accompanying reasons:

1) It is misdirecting to report an inadequate arrangement of te-nets and in the meantime make a feeling that all accessible stan-dards have been found. This circumstance deludes a chief into imagining that just these guidelines are accessible which thusly will lead a leader to dissuade fragmented data. Dissuading fragmented data while not realizing that it is deficient may prompt wrong choices [4].

2) Because of the substantial measure of tenets accessible, a client regularly designs an association rule mining calculation to yield just the most grounded guidelines. It is dangerous to make examination in view of the reporting of the most grounded accessible standards from the computational pursuit that does not cover a complete arrangement of guidelines [5]. There is no assurance that the most grounded association rules found are in reality the most grounded when different standards that might be covered up are considered. It is conceivable that the most grounded tenet lies among the shrouded rules. This circumstance can again prompt a basic leadership unconsciously reaching mistaken determinations about the relationship among things in a dataset.

3) Reporting an association that disregards the nonattendance of things in a given exchange record amid the information mining procedure is deluding. For instance, to report that thing A is connected with thing B is deceiving if a more grounded association can be

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Maximizing Accuracy of Electricity Load Forecasting with Deep Learning

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Abstract— Electricity is one such kind of energy that cannot be stored for a longer duration. The excess production than what is required can cause wastage where as the limited production can lead to scarcity. Thus, it is important to have a balanced production and consumption of electricity. Predicting the consumption that could occur in advance can help in this regard. The work involves generating more accurate predictions with the aid of deep learning. Initially, the neural network is made to learn from the historical data based on which it is expected to produce predictions for a new data set. The number of hidden layers and the hidden neurons is adjusted so as to get the minimum error. The accuracy of prediction is measured in terms of root mean square error (RMSE) and correlation coefficient. The number of hidden layers is increased gradually and accuracy of prediction is measured and compared with different network configurations.
Key words: Deep learning, Electricity load forecasting, Neural networks, RMSE

I. INTRODUCTION

In recent days, neural networks have gained wide importance in solving problems related to pattern recognition, classification, digital signal processing and many more. Even though concept of neural networks was introduced decades ago, it has now come to limelight due to many successes.

The concept of neural networks is based on the idea of making a machine learn from the previous historical data, observe patterns and work efficiently based on the prior experience when exposed to new data. The actions to be taken are adjusted depending on the patterns observed. A feed forward neural network which has more number of hidden layers is an example of deep architecture.

Deep learning can be defined as a branch of machine learning which comprises of visible layers of input and output and more than one hidden layer [1]. Deep neural networks require a huge set of data to work well. Thus it can be used for forecasting the electricity load because of the availability of historical data of load. This kind of historical data is categorized as time series data as it consists of a sequence of data points, which is measured successively over a regular interval of time.

II. RELATED WORK

The important characteristic of a neural network is its ability to learn from the environment and improve the performance through the experience gained from the learning process. Deep learning is said to add on to the accuracy by allowing the network to learn in depth through its multiple layers of hidden units. There has been an extensive research carried out in various areas such as weather forecasting, wind prediction, stock prediction and many more.

Xiao Ding et al [2] adopted deep learning method for stock market prediction. The work presents extracting events from news text and the training is carried out. It is claimed that this system is more capable than the previously reported ones in making profits.

James N.K Liu et al [3] apply deep learning to process massive weather data that involved millions of atmosphere records. The results of the work show that the deep neural network is able to give better predictions and thus deep neural networks can be the potential tools for time series problems.

Thomas Unterthiner et al [4] used deep learning for toxicity prediction. The major goal of the work was to identify toxicophores which are the sets of steric and electronic properties that combine to produce toxicological effect. The work proved that the deep neural networks outperformed all other traditional approaches.

Mladen Dalto et al [5] present the application of deep neural networks for ultra short term wind prediction over various locations. The results of the work prove that the deep neural networks provide increased efficiency over shallow neural networks.

III. METHODOLOGY

The work presented here is intended to know what accuracy a neural network can produce for forecasting electricity load data with different configurations of the network. The deeper networks are expected to produce greater accuracy of prediction. The methodology adopted for carrying out the work is as shown in Fig. 1.
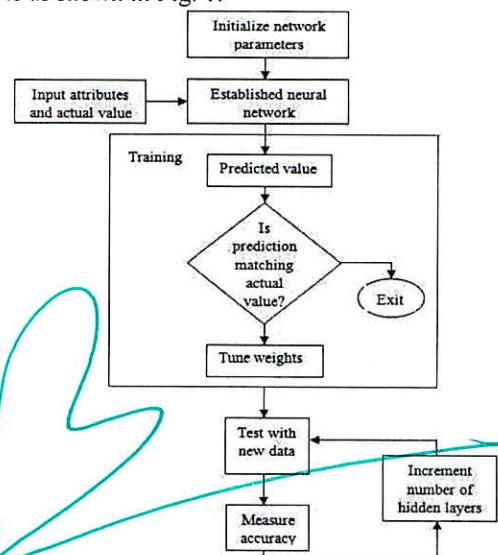

Fig. 1: Proposed Methodology

"Effect of Fiber Volume on Mechanical Properties of Alkaline Treated Unidirectional Long Kenaf Fiber with Egg Shell Powder Reinforced Polymer Matrix Composite"

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Abstract - Recently due to increasing interest in eco-friendly materials, studies on ecofriendly fiber obtained from nature have been actively conducted to the area of composite. Natural plant fibers like Jute, Sisal, Coir, Kenaf, Flax, Hemp, Sugarcane Bagasse, Bamboo pineapple leaf and Banana are typically used in composites as a reinforcing material either as continuous (very long) or discontinuous (chopped) fibers due to their low cost, high tensile strength, low thermal expansion, high strength to weight ratio, renewability, biodegradability and exponential growth. Although, the natural fiber has less strength than the synthetic fiber such as carbon fiber, it has similar strength to glass fiber. Accordingly, it can apply as very advantageous composite when an appropriate resin has been selected. Environmental concerns are now driving demand for recycled polymer (Thermoplastics) such as Polypropylene (PP), Poly Ethylene (PE), Polystyrene (PS), Polyethylene Sulphide (PPS), and Polyolefin etc. For various applications, especially in automotive and aircraft industries. The specimens are prepared according to ASTM standards and the different values are observed. Here filler material used is Egg powder which enhances the tensile property of the material.

1.0 INTRODUCTION

The composites industry has begun to recognize that the commercial applications of composites promise to offer much larger business opportunities than the aerospace sector due to the sheer size of transportation industry. Thus the shift of composite applications from aircraft to other commercial uses has become prominent in recent years. Increasingly enabled by the introduction of newer polymer resin matrix materials and high performance reinforcement fibers of glass, carbon and aramid, the penetration of these advanced materials has witnessed a steady expansion in uses and volume. The increased volume has resulted in an expected reduction in costs. High performance FRP can now be found in such diverse applications as composite armoring designed to resist explosive impacts, fuel cylinders for natural gas vehicles, windmill blades, industrial drive shafts, support beams of highway bridges and even paper making rollers. For certain applications, the use of composites rather than metals has in fact resulted in savings of both cost and weight.

1.1 Definition of Composite

A composite material is defined as the combination of two or more macro constituent materials, which are essentially insoluble into each other such that the properties of the combination are better than the sum of the properties of each constituent taken separately. The objective of this combination is to derive the best qualities of the constituent materials. These composites exhibit desirable qualities, which the constituents themselves may not possess.

1.2 types of Composites

In a broad way composite materials can be classified into three groups in the basis of matrix materials. They are:

1. Metal matrix composites (MMC)
2. Ceramic matrix composites (CMC)
3. Polymer matrix composites (PMC)

1.2.1 metal Matrix Composites:

These composites have many advantages over monolithic metals, like higher specific strength, higher specific modulus, better properties at elevated temperatures, and lower coefficient of thermal expansion. Due to these attributes metal matrix composites are under consideration for wide range of applications.

1.2.2 ceramic Matrix Composites:

One of the main objectives in preparing ceramic matrix composites is to increase the toughness. Naturally it is hoped and also it is found that there is a contomitant improvement in strength and stiffness of ceramic matrix composites.

1.2.3 polymer Matrix Composites:

Most commonly used matrix materials are polymeric. In general the mechanical properties of polymers are inadequate for many structural purposes. Generally their strength and stiffness are low compared to metals and ceramics. To overcome these difficulties other materials are reinforced with polymers.

Two types of polymer composites are:
- Fiber reinforced polymer (FRP)
- Particle reinforced polymer (PRP)

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HARDWARE IMPLEMENTATION OF ARTIFICIAL NEURAL NETWORKS USING BACK PROPAGATION ALGORITHM ON FPGA

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Abstract

In order to handle problems such as massive parallelism, Fault tolerance, self learning, adaptivity, computational complexity researchers have developed intelligent system such as artificial neural networks. ANN(Artificial neural network) addresses the issues related to pattern recognition, prediction, associative memory and control. It mimics the human biological neural network and has a human like learning ability and is inspired by its structure, processing method and its learning ability like a human brain. Different algorithms are proposed by the designers to train the neural networks, among those Back propagation algorithm in its gradient descent form is widely used algorithm which provides better performance. Verilog coding is done for ANN and Back propagation training algorithm . The functionality of Verilog is verified by simulation using ModelsimSE 6.3F Simulator. The Verilog code is synthesized using Xilinx ISE 14.7 tool. Finally ANN and Back propagation algorithm was successfully implemented.

Keywords: ANN, Back propagation algorithm, Fuzzy logic, Synapses

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1. INTRODUCTION

ANN also known as neural networks are the systems which has human like learning ability. It replicates the human biological neuron system. The gained information is stored in internal elements called synapses. It can be used for classification, pattern recognition, weather forecasting, medical science etc. ANN finds major application in the field of image processing. Very complex relation between the input set and the output set can be handled using ANN. They also have the advantages of self learning, adapt easy to the situations, flexibility which make them suitable for noise classification. Many algorithms are proposed to train the ANN among those BPN(Back propagation algorithm) is widely used. In BPN the errors are propagated in backward direction and the weights are updated. Weight Updation may take several iterations until the difference in the actual and obtained value becomes zero. Neuro-fuzzy model are neural network based fuzzy system where ANN is used for processing of data and fuzzy sets are used to handle the randomness. They are also used in image processing for various applications such as classification, enhancement, edge detection, segmentation. The fuzzy sets are controlled using neural networks with a pair of inputs and outputs. First the system behaves as ANN which is trained with suitable algorithm and at execution time it behaves like fuzzy. Generally the neural chip is implemented using ANN which is trained using software but this makes the chip fixed without further modifications. In order to overcome this limitation learning algorithm in ANN can be implemented using hardware. The selection of training algorithm depends on hardware implementation, so training sets which occupies less FPGA area is most suitable. So gradient descent BPN in its steepest form is considered. The FPGA implementation of the proposed method gives better performance compared to the existing methodologies.

2. DETAILS EXPERIMENTAL

2.1 Artificial Neural Network

ANN is the model which computes the complex relationship between inputs and the outputs. It is a non-linear modeling tool. The basic computing elements are neurons. They are responsible for processing of information through interconnection. They are non-linear data modeling tools which are used for patterning the data, classification etc. There are basically two types of learning algorithm: Supervised learning and unsupervised learning. In supervised learning the inputs and outputs are known prior to the computation whereas in unsupervised learning is similar to learning without a teacher. From the below figure it can be seen that the neural network consists of input layer, hidden layer and output layer. Initially all the calculations from the input sets are carried towards the output layer through the hidden layer. Each neuron is a combination of a summer and a activation function. Initially the inputs from the input layer are multiplied with the weights and given to the hidden layer where the multiplied values are summed up and given to activation function. In the proposed model sigmoidal activation function is used
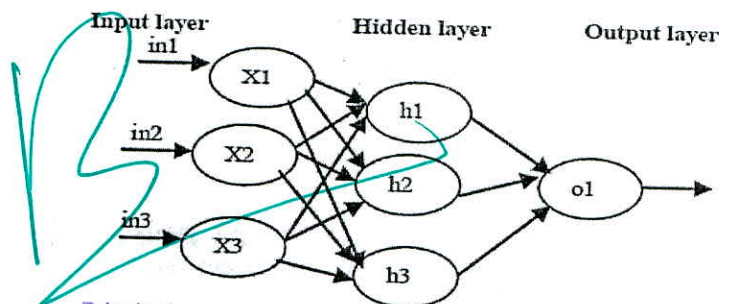
Fig 1: Neural network structure.

Packet Switched Wormhole Router Design and Low Latency Adapter Design for NOC Architecture and Its FPGA Implementation

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Abstract— As growth in an integrated technology the number of processing elements used in single chip increases, which causes the interconnection of elements in a chip is complex using conventional bus based system. A network on chip (NoC) is new paradigm for communication between components in a system on chip. Other aspect is the speed of communication between nodes gets reduced, for this reason various routing algorithms and switching techniques are introduced, amongst selection is a main criteria. In this project wormhole switching with XY routing algorithm is used. The speed of the communication between components is increased though adapter design. In this project wishbone architecture is used to communicate between nodes. The Mesh topology is used to reduce the network congestion problems in NoC. IP cores and adapter are designed using Wishbone Protocol to communicate with NoC nodes. The design will be implemented using Artix-7 FPGA board. ISim tool is used to simulate and test the system.
Key words: System on Chip (SoC), Network On chip (NoC), Wishbone Protocol, Field programmable gate array (FPGA), Packet Switched Wormhole Roting (PWR)

I. INTRODUCTION

As Moore's Law continues to hold true for the near future, the design of embedded systems becomes challenging and complex due to large number of hardware modules and the difficulty of interconnecting them. Designers have shifted their focus from micro-level to macro-level system design through the employment of hardware reuse. This shift in focus has opened the way for adoption of System-on-Chip (SoC) paradigm (called FPSoC when implemented in FPGAs). This involves interconnecting pre-made hardware modules together to form a coherent system. These hardware modules are known as Intellectual Property (IP) cores[1].

The NoC medium features a high level of modularity, flexibility, and throughput. The NoC relies on data packet exchange. The path for a data packet between a source and a destination through the routers is defined by the routing algorithm. Therefore, the path that a data packet is allowed to take in the network depends mainly on the adaptiveness permitted by the routing algorithm, which is applied locally in each router being crossed and to each data packet [2].

A NoC consists of four major components shown in Fig.1. IP cores, the network adapters, routing nodes and links. These are similar to the components in a macro computer network. There are many different architectures, mechanisms, parameters and techniques involved in NoCs [8].
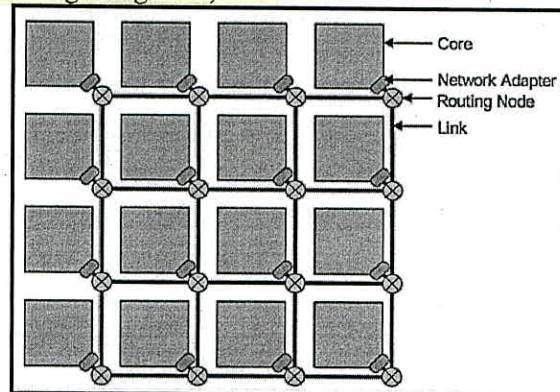

Fig. 1: NoC component overview

The massive design space of NoCs means that even a simple design of a NoC component is a valuable research contribution since it expands on existing understandings and provides reinforcement to existing theories. More precisely, the optimal selection of the channel width in packet-switched routers remains an open research problem [3].

II. LITERATURE SURVEY

Matthew Murawski et al.[1] design and evaluation of two major NoC components: a flexible adapter compatible with the Altera Avalon interconnect standard and a parameterizable wormhole router is discussed, The Avalon compatible adapter will be very useful to NoC designers using IP cores provided by Altera to implement NoC-based systems on Altera FPGAs.

Mohandeep Sharma et al. [2] A survey of the Wishbone bus and its comparison with three other buses AMBA from the ARM, CoreConnect from the IBM and Avalon by the Altera Corporation reveals that in terms of compared performance parameters, the Wishbone bus tends to gain an upper edge over the other three types because it provides for connecting circuit functions together in a way that is simple, flexible and portable due to its synchronous design.

Swati R. Mishra et al. [5] The Wishbone interconnect is proposed as a general purpose interface. As such, it defines the standard data exchange between IP core modules. The Wishbone architects were strongly influenced by three factors.

First, there was a need for a good, reliable System-on-Chip integration solution. Second, there was a need for a common interface specification to facilitate structured design methodologies on large project teams. Third, they were impressed by the traditional system integration solutions afforded by microcomputer buses such as PCI bus and VME bus. A SoC which utilizes ALU master cores and memory slave cores using Wishbone bus interconnection scheme has been designed for this purpose.

Design and Simulation of Compact Multiband Microstrip Fractal Patch Antenna for C Band Applications

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ABSTRACT: In recent years multiband fractal patch antennas have their own capability because of their multiband operation. This paper presents a rectangular shaped fractal antenna, which resonates at 4.18GHz, 5.02GHz, 6.45GHz,7.08GHz.Three iterations has been applied to basic rectangular patch in terms of rectangular slots to obtain multiband. This antenna finds the application in the area of military and defense applications. The proposed multiband antenna operates in C (4 to 8GHz) band, where it can be used for Radar and secure communication. The antenna is designed in IE3D simulation software. The results are analyzed in terms of return loss, VSWR and gain of the antenna with radiation pattern.

KEYWORDS: Fractal shape, IE3D, Multiband, rectangular slot.

I. INTRODUCTION

The increase in demand for wireless communication system has attracted significant interest in antenna design. Many novel designs are being proposed for multiband antenna. Microstrip patch antennas are gaining popularity for use in modern wireless communications systems due to their low-profile, low weight, low cost structure. Therefore they are extremely compatible for defence antennas in wireless communication such as Radars, satellites etc.

The various fields of applications such as in the radar applications, satellites and even in the military systems like in the aircrafts, missiles, rockets, etc. The microstrip antennas are having more usage in all the fields and areas and now they are gaining popularity in the commercial aspects due to the low cost of the substrate material and fabrication. The patch antennas are also used as wide range over the conventional antennas because of their good advantages over conventional antennas and maximum application in the various areas such as military, defense, radar, satellites, etc.

Radar Application: Radar is used for detecting moving targets example people and vehicles. It requires a low profile, light weight antenna subsystem, the microstrip antennas are the ideal choice. The fabrication technology is based on photolithography and enables the bulk production of microstrip antenna with reconfigurable characteristics and performance at a cheaper cost in a lesser time as compared to the conventional antennas.

Related work

The fractal word meaning is broken or irregular fragments were first defined by Benoit Mandelbrot in 1975 to represent a family of complex shapes that possess an inherent self-affinity and self-similarity in their geometrical structure. A self-affine set is a well-defined contraction which reduces an image by different factors horizontally and vertically [7] whereas a self-similar is one that consists of iterateddown into copies of itself i.e. a contraction which reduces an image by same factors horizontally and vertically [7]. Due to these properties, fractals have infinite complexity and detail. As long as you are zooming in on the right location, their complexity and detail remain the same no matter how far you zoom-in.The patch antennas are having advantages over conventional light weight and low volume, low profile, low fabrication cost, supports multiband frequency operations, and it is mechanically robust when mounted on rigid surfaces [1]in making such low-profile systems in communication domain, the size of the antenna is critical. Therefore, many kinds of miniaturization techniques, such as the substrates of high dielectric constants, applying resistive or

OPTIMIZED BIOMETRIC SYSTEM BASED ON COMBINATION OF FACE IMAGES AND LOG TRANSFORMATION

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ABSTRACT

The biometrics are used to identify a person effectively. In this paper, we propose optimised Face recognition system based on log transformation and combination of face image features vectors. The face images are preprocessed using Gaussian filter to enhance the quality of an image. The log transformation is applied on enhanced image to generate features. The feature vectors of many images of a single person image are converted into single vector using average arithmetic addition. The Euclidian distance(ED) is used to compare test image feature vector with database feature vectors to identify a person. It is experimented that, the performance of proposed algorithm is better compared to existing algorithms.

KEYWORDS

Biometric, Face recognition, log Transformation, ED, Fusion, Gaussian filter

1. INTRODUCTION

Biometrics is the measurement and analysis of behavioural and physiological trait characteristics of a person. It is used to identify a person to utilise electronic gadgets and entry in to restricted areas through smart gates or doors. The conventional human authentication methods used are smart cards, passwords, Personnel identification number (PIN) etc. The disadvantages are (i) Passwords are hard to remember (ii) PIN and smart cards can be stolen or lost. Biometrics is the alternate to conventional methods of authentication as the traits of biometrics are attached to human body parts and based on the behaviour of person. The biometric system has three divisions viz., (i) enrolment division (ii) test division and (iii) matching division. In enrolment division, the database images are loaded preprocessed and features are extracted. In test division, the test images are loaded, preprocessed and features are extracted. The matching division has classifiers to classify images inside the database.

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Research Article

OPTIMIZATION OF MICROWAVE ASSISTED EXTRACTION OF PHENOLIC COMPOUNDS FROM *DECALEPIS HAMILTONII* ROOT USING RESPONSE SURFACE METHODOLOGY

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ABSTRACT

Polyphenolic compounds comprising flavonoids and phenolic acids are widely distributed in foods of plant origin and counted to be the most abundant antioxidant in our diet. Due to its health benefitting properties they are of great interest in recent days. *Decalepis hamiltonii* is one such plant that is rich in phytochemicals having antioxidant properties and other beneficial medicinal value. Maximum yield of these phytochemicals during extraction requires optimized conditions of process parameters. In the present study, Microwave-assisted extraction (MAE) of polyphenols from the *Decalepis hamiltonii* roots was optimized using response surface methodology. The effect of independent variables such as extraction time (1, 3 and 5 min), solid to solvent ratio (0.5, 1.75 and 3 g/25ml solvent), solvent concentration (30%, 60% and 90% ethanol) and their interaction on Total Phenolic Content(TPC) and Total Flavonoid Content (TFC) were determined by three factor- three level Box-behnken Design. The highest TPC (0.03 mg GAE/mg DHRP) and TFC (0.08 mg RE/mg DHRP) were obtained under the optimum extraction conditions of 3 min, 2.56 gm/25 ml of solvent, 53.77 % ethanol and 2.15 min, 3 gm/25 ml of solvent, 49.18 % ethanol respectively. These findings further demonstrate that extraction of bioactive phytochemicals from plant materials using MAE method consumes less extraction solvent and saves time.

Keywords: *Decalepis hamiltonii*, Polyphenols, Response Surface Methodology, Microwave Assisted Extraction.

INTRODUCTION

Antioxidants are both natural and synthetic compounds able to scavenge free radicals and inhibit oxidation processes (George and Britto, 2015). Polyphenolic compounds comprising flavonoids and phenolic acids are widely distributed in foods of plant origin and found to be the most abundant antioxidants in our diet (Hayat et al., 2009). They are a large family of natural compounds which are secondary metabolites and are derivatives of the pentose phosphate, shikimate and phenylpropanoid pathways in plants. Phenolic compounds exhibit a wide range of beneficial properties to health, such as: anti-allergenic, anti-inflammatory, anti-microbial, anti-oxidant, antithrombotic, cardio protective and vasodilatory effects. Several beneficial effects derived from phenolic compounds are mainly due to their antioxidant activity (Ajila et al., 2011).

Pressurized liquid extractor (PLE), microwave assisted extraction (MAE), ultrasound assisted extraction, soxhlet extraction, heat reflux extraction and supercritical fluid extraction are various efficient and advanced extraction techniques developed for extracting phenolic compounds from herbal medicine (Dahmoune et al., 2015). Microwave Assisted Extraction (MAE) is a relatively new method which has been increasingly used for extraction of valuable compounds from biological cells. This is an extraction technique that delivers microwave energy rapidly to a total volume of solvent and solid plant matrix. This results in subsequent heating of the solvent and solid matrix, efficiently and homogeneously (Kaufmann & Christen, 2002). There are a number of parameters that influence the microwave extraction process such as choice of solvent, solvent volume, microwave power, extraction time and matrix characteristics. Highly polar solvents interact better in a microwave environment, leading to faster heating rate, greater destruction of

biological structure and higher extraction yields (Chandrasekar et al., 2015). MAE is increasingly being used as an alternative to traditional extraction method for the removal of phenolics from plant tissues as it significantly reduces extraction time and solvent consumption while generating higher extraction yields (Ballard et al., 2010).

The traditional method of optimization involves the study of one-factor-at-a-time that is laborious and time consuming. Moreover, the interactive effect of individual factors is also ignored and misleading conclusion may be drawn. Because of the above reasons it becomes cumbersome to establish the optimum conditions. It is therefore essential to optimize the procedure yielding highest quantities of phyto compounds with almost preserved functional properties. Recently, response surface methodology (RSM), a statistical experimental protocol used in mathematical modelling, has emerged as an ideal strategy for standardizing process variables of many food processes and is being extensively used. The merits of RSM include use of lesser number of experimental measurements; provide a statistical interpretation of the data and also to identify the interaction amongst variables, if any. RSM has been successfully applied in optimizing extraction condition of a range of polyphenols, antioxidants and other metabolites in plants (Ilaiyaraja et al., 2015; Alberti et al., 2014; Zhang et al., 2013).

Decalepis hamiltonii (Wight and Arn.) belonging to the family Asclepiadaceaeis a climbing shrub that grows in the forests of peninsular India. It is widely studied as it one of the most potent antioxidant source with varieties of biological activity which could be associated with their health benefit (Nayaka et al., 2010; Srivastava et al., 2007). The roots are used in folk medicine and as a substitute for *Hemidesmus indicus* in ayurvedic preparations. The roots are also used to stimulate appetite, relieve flatulence and as a general tonic.

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FPGA IMPLEMENTATION OF MOVING OBJECT AND FACE DETECTION USING ADAPTIVE THRESHOLD

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ABSTRACT

The real time moving object and face detections are used for various security applications. In this paper, we propose FPGA implementation of moving object and face detection with adaptive threshold. The input images are passed through Gaussian filter. The 2D-DWT is applied on Gaussian filter output and considered only LL band for further processing to detect object/face. The modified background subtraction technique is applied on LL bands of input images. The adaptive threshold is computed using LL-band of reference image and object is detected through modified background subtraction. The detected object is passed through Gaussian filter to get final good quality object. The face detection is also identified using matching unit along with object detection unit. The reference image is replaced by face database images in the face detection. It is observed that the performance parameters such as TSR, FRR, FAR and hardware related results are improved compared to existing techniques.

KEYWORDS

Discrete Wavelet Transform, Gaussian Filter, Adaptive Threshold, Object Detection, Face Recognition.

1. INTRODUCTION

Biometrics are used to identify and verify persons based on their physical and behavioural characteristic parameters. The physical characteristic traits are fingerprint, Iris, Palm print, DNA etc. of a person and are constant throughout life span. The recognition using physiological traits are easy and require less number of samples to build high speed real-time biometric system efficiently with less complexity. The recognition using behavioural traits are not very accurate and require more number of samples to build real time biometric system. The behavioural

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Total Additive Expected Time Metric for Scalable Hybrid Wireless Mesh Routing Protocol in Wireless Mesh Networks

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Abstract--Recent developments in the area of mesh networks shows significant achievement in the field of coverage and connectivity. The Wireless Networks provides flexibility and adoptability in terms of service for the Internet users. The scalability is the major concern in the large wireless networks which keep growing randomly. There is a need of scalable routing protocol for Wireless Mesh Networks and interestingly suitable metric is also a major concern. We have proposed a Scalable Hybrid Wireless Mesh Protocol (SHWMP) and also new routing metric named Total Additive Expected Time (TAET) to provide optimal route from source to destination. The new proposed metric covers several parameters such as interference, channel diversity, link quality and hop delay for consideration and results in finding a suitable route for SHWMP. The performance of SHWMP is evaluated in a different network conditions and simulation results show that new metric TAET outperforms MIC, WCETT and other metrics in terms of throughput, end-to-delay and network density.

Keywords--Wireless Mesh Networks, Scalable Hybrid Wireless Mesh Protocol (SHWMP), Routing metric, performance evaluation

I. INTRODUCTION

RESEARCHERS have considered Wireless Mesh Networks (WMNs) as a key technology for them to work on next generation wireless networks. WMN is a mesh network which is implemented over a wireless network system with low cost, high scalability, reliable services and easy maintenance. Another direction or alternative for last-mile broadband Internet access which has greatest potential to play a critical role is Wireless Mesh Networks. In case of wireless mobile environment, the network layer and its routing functionality must be tailored to support mobile nodes, dynamic topologies and changing link capacity [1]. Routing needs to be adapted to a specific application and also it must match radio environment. Cross-layered design techniques have been proposed for wireless networks to improve the system performance [2, 3, 4] and security [5].

The present 802.11 based wireless networks completely depend on wired infrastructure to transfer the traffic to end users. This makes wired infrastructure expensive and inflexible for wireless local area networks (WLAN) as coverage cannot be extended beyond the back-haul deployment. The performance of a WMN is mainly dependent on the design of the routing protocols and also associate

metric used to measure it. The main goal of any routing protocols is to select the best path between the source and destination based on the routing metric. Most of the existing protocols used in WMNs rely on the network layer (IP) and use hop count to allow multi-hop communication and do not provide an good solution for wireless networks. The new standard IEEE 802.11s was developed by IEEE task group to design and develop a scalable integrated mesh networking solution. Even though, this group set hybrid wireless mesh protocol (HWMP) [6] as default routing protocol, but still there exists scope for extending scalable routing protocol for WMN. In addition this, airtime [7] metric was considered as default routing metric. We designed and developed a new scalable routing protocol called SHWMP (Scalable Hybrid Wireless Mesh Routing Protocol) [8]. In this paper we propose a new metric called TAET (Total Additive Expected Time) is suggested to measure the performance of scalable routing protocol. The airtime metric was only focus on consumption of resource by a packet on a link. This metric only cannot be used as standard, since there are so many parameters which mainly required measuring the overall performance of WMN.

The rest of the paper is organized as follows: In section II, presents the related work carried out recently is discussed. Section III Briefly SHWMP and new routing metric TAET is discussed. In Section IV simulation results are analyzed with comparing other metrics. Finally conclusion is drawn in Section V.

II. RELATED WORK

Many researchers specifically designed and suggested routing metrics for Wireless Mesh Networks. But each metric designed has got a clear involvement of any one of prominent parameters ignoring others. This leads to the development of underutilized metric giving not optimal results. To overcome this problem, a new metric is suggested by using the combination of existing matrices. We discuss few metric such as ETX, WCETT, ETT and airtime already used in the evaluation of routing protocols. The detailed survey of WMN routing metrics are discussed in [8, 9, 10, 11, 12]. The capacity of mesh networks in terms of throughput is increased by equipping each node with a multiple radio interfaces and with multiple channels [10]. The critical performance in wireless mesh networks is considered to be routing metrics. The metrics used in ad hoc networks is not appropriate for wireless mesh networks. The unique characteristics of mesh networks make invalidate existing solutions from both wired

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Study on self healing Metalized polypropylene Film Capacitor and its Uncoupling behaviour of current gates

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Abstract

Polymer dielectrics have largely supplanted other insulators such as paper, because of their excellent dielectric and physical properties, low cost and availability in very thin films. The most important of these are polypropylene, polycarbonate, polystyrene, polyethylene, and polyethylene terephthalate (PET). Recent high power capacitor technology use thin polypropylene (PP) foils as a dielectric with 15 nm thin patterned electrodes instead of all-over metalized films. The metal electrode consists of individual segments interconnected by narrow current gates. The gates serve as fuses in case of a breakdown in one of the segments. They isolate the segment and therefore the breakdown channel from the rest of the electrode. Therefore the capacity only decreases slightly and the capacitor is protected against complete destruction. This process is called self-healing. Capacitors in operation showed that in case of a breakdown not only the defect segment but also the surrounding and the distant segments are often uncoupled, leading to a higher decrease of capacity and consequently of the capacitor lifetime. The aim of the study was to understand the mechanism that breaks off distant current gates. Therefore we stressed current gates with low voltages and currents, determined the energy involved in the uncoupling process and investigated the broken gates with light microscopy. Resistance curves gave important information about the influence of structures at the PP foil surface on the uncoupling behaviour.

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Study on self healing Metalized polypropylene Film Capacitor and its Uncoupling behaviour of current gates

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Abstract— Polymer dielectrics have largely supplanted other insulators such as paper, because of their excellent dielectric and physical properties, low cost and availability in very thin films. The most important of these are polypropylene, polycarbonate, polystyrene, polyethylene, and polyethylene terephthalate (PET). Recent high power capacitor technology use thin polypropylene (PP) foils as a dielectric with 15 nm thin patterned electrodes instead of all-over metalized films. The metal electrode consists of individual segments interconnected by narrow current gates. The gates serve as fuses in case of a breakdown in one of the segments. They isolate the segment and therefore the breakdown channel from the rest of the electrode. Therefore the capacity only decreases slightly and the capacitor is protected against complete destruction. This process is called self-healing. Capacitors in operation showed that in case of a breakdown not only the defect segment but also the surrounding and the distant segments are often uncoupled, leading to a higher decrease of capacity and consequently of the capacitor lifetime. The aim of the study was to understand the mechanism that breaks off distant current gates. Therefore we stressed current gates with low voltages and currents, determined the energy involved in the uncoupling process and investigated the broken gates with light microscopy. Resistance curves gave important information about the influence of structures at the PP foil surface on the uncoupling behaviour.

Keywords— Self healing; Current gate; Polyethylene teraphtalate foil; Polypropylene foil.

INTRODUCTION

The primary polymer foil materials used in capacitors are biaxially stretched oriented isotactic polypropylene (PP) and polyethylene teraphtalate (PET). Today high power capacitor technologies use patterned electrodes evaporated on the dielectric instead off all-over metalized films. In a capacitor usually two metalized foils are wound together to a capacitor winding. To avoid air enclosures in the capacitor rolls causing glow discharges in the winding gaps, oil or gas is used as impregnation medium. The excellent large area electrical breakdown strength of PP foils due to the high quality with which they can be made consistently and the homogenization effect taking place with oil impregnation of PP foils [1] are the major reasons why such capacitors can be operated at very high electric fields in the range of 240 V μm^{-1}.

Fig.1 shows mosaic of metallized capacitor film. In self-healing capacitors, the electrodes are evaporated onto the polymer foil as very thin films of metal. The metal used is Aluminium, zinc or a zinc– aluminium alloy. In case of a breakdown through the dielectric, the thin electrode near the defect site is rapidly evaporated and driven outwards from the breakdown site. Thus the plasma of the breakdown arc is interrupted and the site becomes electrically isolated. These are the series of events described as self-healing [2, 3]. This self-healing process makes the system defect tolerant since local breakdowns cause only little damages. The choices of the metallization as well as the thickness of the electrode are important parameters determining the self-healing capability of the system. The thinner the layer is, the more likely the self-healing will be successful. Unfortunately, if one goes too thin, the electrode resistance increases leading to losses of heat. Therefore the thermal stress of the capacitor increases and impairs the capacitor lifetime [4, 5].
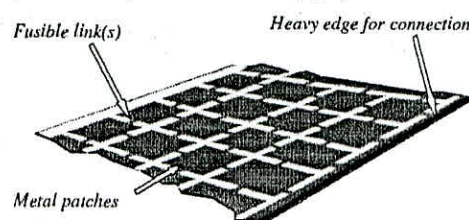

Fig. 1: Patch mosaic of metallised capacitor film.

Incomplete evaporation of the electrode around the breakdown channel and deposition of carbon from the dielectric, which give rise to conductive bridges in the insulating areas free from metal present a danger for continually discharging of the capacitor [6]. Therefore the patterned electrode reveals a second protection concept. The individual segments are interconnected by narrow current gates. In case of a breakdown in one of the segments the gates serve as fuses, they isolate the segment and therefore also the breakdown channel with the surrounding evaporated electrode area form the rest of the electrode. Thus the damage of the capacitor is double localized and the capacitor is prevented from continually discharging leading to large-scale damage and eventual destruction.
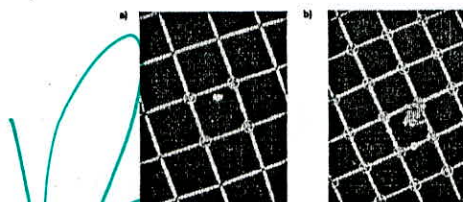
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Alternative Approach to Evaluation of Absorption Correction Factor for Cylinder using Generalised Gaussian Quadrature Rule

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Abstract. This paper presents Numerical evaluation of Absorption correction factor for cylinder by using Generalised Gaussian quadrature rule. The new formula increases the accuracy in comparison with the original Gauss-Legendra quadrature rules and Simpson's method which were recently applied by Maslen(1999) and Takashi Ida(2010) et al. results obtained with the Generalised Gaussian quadrature method are compared with the existing formulae. It is shown that the Generalised Gaussian quadrature method has higher accuracy than the existing formulae.

Keywords: Finite element method, Generalised Gaussian quadrature rule, Numerical Integration.

AMS Mathematics Subject Classification (2010): 65R10

1. Introduction

The path traversed by a monochromatic beam of intensity I_0 through a homogeneous isotropic material of linear absorption coefficient μ. Then reduced intensity in the beam is given by

$$I = I_0 e^{-\mu T} \tag{1}$$

The path length T of the beam in the material (crystal) varies as the shape of the crystal. Therefore this equality can also be considered for the X-ray absorption for the crystalline solids whose absorption does not depend on the arrangement of the atoms in the unit cell. If the crystalline solid have a definite shape then different paths have different lengths T, then we have

$$L = \int_v I\, dv \tag{2}$$

Where v is the volume of the crystal the expression for the transmission coefficient is given by
$$A = \frac{1}{v} \int_v I_0\, e^{-\mu T}\, dv \tag{3}$$

This formula above Eq. (3) was formulated for the estimation of transmission factor in crystals of uniform cross-section as A depends on the thickness, the shape of the crystal

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