







# Chemo-physico-mechanical characteristics of high-strength alkali-activated mortar containing non-traditional supplementary cementitious materials

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## Abstract

The effect of non-traditional cement replacement materials as a replacement

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# Novel masonry grout incorporating high volumes of industrial by-products: microstructure characteristics and pursuance of durability properties

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## Abstract

One solution to the high cost and scarcity of building materials is to use alternative and sustainable materials. The study presented herein developed an eco-friendly masonry grout using high volumes of palm oil clinker powder to replace cement and palm oil clinker to replace coarse aggregate. Several batches of grouts with different amounts of these materials were made to determine the technical viability of the grout. Scanning Electronic Microscope (SEM), X-Rays Diffraction (XRD), Energy Dispersive X-Ray (EDX) and Thermogravimetric Analyzer (TGA) analyses were conducted to investigate the microstructure characteristics of the grout, and water absorption, initial rate of absorption, sulphate attack and electrical resistivity tests were conducted to determine its durability. Compressive strength tests were conducted at different curing ages and the drying shrinkage of the grout was monitored for 180 days. The results indicate that the new grout is as good as a conventional grout but with added sustainable and economic benefits. The new grout can be used in masonry construction and can be used to alleviate the inadequate supply of affordable housing.

**Keywords** Masonry Grout · Palm Oil Clinker (POC) · Palm Oil Clinker Powder (POCP) · Lightweight Aggregate · Sustainability · Microstructure Behaviour and Durability

## Introduction

Masonry is a composite material and its constitutive relationship is complex with distinguishing material properties, which are directly related to the properties of its constituents. Modern masonry has two main components: the masonry unit and mortar. Masonry grout is added to the basic system

to increase bearing load capacity and reinforcement is added when the system needs to resist tensile loads.

A current common practice in masonry construction is to use hollow masonry blocks (HMB) or units due to the lightweight of the units, affordability and increased mason productivity. Although HMB masonry construction is effective in resisting compressive loads, it requires continuity between the units when the structure needs to resist lateral loads. For such cases, the structure needs to be reinforced and reinforcement requires masonry grout to bond the reinforcement to the masonry units.

Several studies have been conducted on masonry grout that contains environmentally friendly materials such as fly ash, bentonite, ground granulated steel slag, water glass [1–3], hydraulic lime [4–6], clay-based grout [7], waste marble powder [8], perlite by-product [9] and metakaolin [6]. Studies on the utilisation of palm oil industrial by-products or palm oil clinker (POC) in masonry grout are, however, very limited [10] even though studies have demonstrated the highly pozzolanic reactive binding characteristics of POC [11, 12].

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# Experimental Study On Self-Curing Concrete Using LECA And Sodium Acrylate

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## Abstract

Water is a source of life. In the upcoming era, society faces dramatic issues on water scarcity. Construction without water is practically impossible. In the manufacturing of concrete, Curing requires a large quantity of water. New advancement in Science and technology to ensure undisturbed hydration with replenishment of water loss and to maintain temperature for the process of hydration as in [9]. This will intend the development of strength and durability of concrete. Curing decreases the permeability of the hardened concrete, thereby reducing the crack formation. In this experimental study, the conventional concrete is compared internally cured with Lightweight Expanded Clay Aggregate (LECA) and Sodium Polyacrylate (SP). Conventional concrete is compared with self-curing concrete. All the testing procedures are formulated as per Indian Standards.

**Keywords:** Internal curing, Lightweight Expanded Clay Aggregate (LECA), Sodium Polyacrylate (SP), Self-curing, Superabsorbent Polymer.

## INTRODUCTION

Building Construction without water is unimaginable. Since the water needs are huge, the buildings are a necessity to switch over alternatives such that water usage can be reduced as in [1]. Thus, self-curing systemizes are the new emerging trend for conservation of water in the construction industry. To promote a sustainable environment, we have to switch over alternatives as in [2]. Curing of concrete is done to maintain optimum moisture content, to prevent the loss of water required for hydration of the cement as in [3], to avoid shrinkage cracks and premature stressing or disturbance in concrete, as in [4]. According to ACI, a process by which hydration of cement continues because of the availability of internal water is not part of the mixing water. Curing often happens "from outside to inside." In contrast, internal curing happens "from inside to outside" through internal reservoirs like super absorbent polymer and lightweight clay aggregate as in [2].

To achieve the designated self-curing concrete properties, water evaporation at the surface has to be avoided in addition to supplying water from the exterior. Mineral admixtures are now used in partial replacement with cement

to reduce the pollution caused by the manufacturing of cement; these admixtures as like cement, don't completely blend with the components of cement as in [5]. Hence these conventional methods require high demand for curing as compared to ordinary Portland cement. When water for the curing is unavailable, due to depercolation of the capillary porous nature, early age cracking is quite usual as in [6-]. On the other hand, the early development of crack is due to shrinkages during hydration. Usually, shrinkages would be due to either drying, thermal or carbonated shrinkage as in [9-11]. Chemical shrinkage is an internal volume reduction due to the absolute volume of hydration as in [12]. The alternative source for these aspects of limitations is sustainable building with a newly emerging field of advancement as in [13,14].

In this experimental study,

- Presoaked LECA of 10%, 20%, 30%, and 40% are partially replaced with normal weight aggregate as a source of additional water.
- SP is added to concrete of 0.2, 0.25, 0.3, 0.4, and 0.5% of cement.
- Compressive and tensile strength tests are done on this internally cured concrete.

## MATERIALS USED

- Ordinary Portland cement (OPC)
- M<sub>30</sub> grade of Concrete (1:1.65:2.24)
- Coarse aggregate (20mm)
- Fine aggregate (passing through 4.75mm sieve)
- 20mm LECA
- Sodium Polyacrylate (SP)

## LIGHTWEIGHT EXPANDED CLAY AGGREGATE (LECA)

Lightweight expanded clay aggregate (LECA) is obtained by heating clay at 1200 C in a rotary kiln; the gases yielded expands the clay by thousands of small bubbles forming a honeycomb structure.

### Physical Properties


Table 1

PROPERTY	VALUE
Specific Gravity	0.9
Water Absorption	16%




Correction | Published: 03 May 2021

## Correction to: Soil Nutrient Detection Based on Photonic Crystal Hexagonal Resonator for Smart Farming

Elizabeth Caroline Britto , Sathish Kumar Donasegaran, Susan Christina Xavier & Jeyarani Jayaseelan

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Susan Christina Xavier's affiliation is correct as reflected here.

The original article has been corrected.

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# Design of Reconfigurable Tri-Band Antenna for Wireless Communication

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**Abstract.** The Design is a quotidian rectangular patch antenna which functions on three Different frequency bands. Tri-band antenna is an electronic device that can operate in three different frequency bands. Taking the advantage of antenna parameter modification in to account the tri-band operation is achieved. Reconfigurable antenna is capable of modifying its frequency and radiation properties in a controlled and changeable manner. The antenna is designed with the use of dielectric substrate of 1.6mm thickness with permittivity of 4.6. The design is simulated in HFSS platform. In designed antenna, configuration I engages in three different bands of frequencies 1.3 ~ 3, 4.1 ~ 4.7, 6.1 ~7.6 GHz where the return loss value is around and below -10 dB. The Configuration I is designed to have an enhanced performance over a specified range of frequency (1.5 GHz to 3 GHz). But configuration II is devised to have a subsided performance over all UWB frequency ranges. The return loss of configuration II is -15 dB over 1.25 GHz to 2 GHz range and -12 dB over 4.25 GHz to 5.75 GHz range, -14 dB for 7.5 GHz to 8.5 GHz range. Switching between the frequencies is achieved using three symmetrical ideal RF MEMS switches. The Patch antenna which can be applicable to wireless communication systems like Sensing, RFID, WLAN is presented.

## 1. Introduction

An electronic equipment which serves as a medium for the transfer of EM waves is termed as antenna. Ever since the invention of antennas, plenty of modification came in to limelight as the research progresses towards miniaturization and compact antenna which serves multiple needs. And that is how reconfiguration entered in to the play. Reconfigurable antennas are the one which is capable of adapting to different changes such as change in frequency, polarization, pattern of radiation [1]. Antenna with reconfigurable capability serves well the need of replacing single antenna for multiple applications. The proposed one is such an antenna with Frequency Reconfigurable capability. Reconfiguration can be achieved by changing antennas electrical or physical properties. In the proposed antenna the reconfiguration is achieved with the use of switches. The multi-band antenna became more important in communication system ever since carrier collection technique of Long term evolution - advanced communication system was proposed. Nowadays researchers in wireless communication field is doing researches on multiband Microstrip antenna, which is applicable for wireless communication system, Sensing based networks for disaster management, Personnel Identification at official locations using Radio Frequency, Wireless services to be provided within specific distances, Bluetooth systems, and in places where MIMO systems are required. The benefit of Microstrip antennas [2-3] Are the Reduced mass of the radiating material and antenna portrait is also low, alliance of patch is bit easy with surface-mount material and it is adjustable for different band operations like dual, Tri-band. When compared to conventional antennas Antenna Configuration I and



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## Intelligent Deep Learning Based Disease Diagnosis Using Biomedical Tongue Images

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**Abstract:** The rapid development of biomedical imaging modalities led to its wide application in disease diagnosis. Tongue-based diagnostic procedures are proficient and non-invasive in nature to carry out secondary diagnostic processes ubiquitously. Traditionally, physicians examine the characteristics of tongue prior to decision-making. In this scenario, to get rid of qualitative aspects, tongue images can be quantitatively inspected for which a new disease diagnosis model is proposed. This model can reduce the physical harm made to the patients. Several tongue image analytical methodologies have been proposed earlier. However, there is a need exists to design an intelligent Deep Learning (DL) based disease diagnosis model. With this motivation, the current research article designs an Intelligent DL-based Disease Diagnosis method using Biomedical Tongue Images called IDLDD-BTI model. The proposed IDLDD-BTI model incorporates Fuzzy-based Adaptive Median Filtering (FADM) technique for noise removal process. Besides, SqueezeNet model is employed as a feature extractor in which the hyperparameters of SqueezeNet are tuned using Oppositional Glowworm Swarm Optimization (OGSO) algorithm. At last, Weighted Extreme Learning Machine (WELM) classifier is applied to allocate proper class labels for input tongue color images. The design of OGSO algorithm for SqueezeNet model shows the novelty of the work. To assess the enhanced diagnostic performance of the presented IDLDD-BTI technique, a series of simulations was conducted on benchmark dataset and the results were examined in terms of several measures. The



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## Analysis of mechanical properties of cold extruded Al 6061 TiB<sub>2</sub> MMCs and validated for finite element analysis

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### ABSTRACT

In the present work, synthesized composite of aluminium matrix composite reinforced with 8 wt% of TiB<sub>2</sub> particles and the base Al6061 alloy were fabricated by stir casting method and secondary worked with cold extrusion die. The billets were prepared for the dimension of diameter 18 mm and length 90 mm. specimens were subjected to cold extrusion process with extrusion ratio of 1.2656 under laboratory condition. The mechanical properties such as Rockwell hardness tensile strength were determined as per the ASTM standard E08-16 and ASTM standard ASTM E18-15. It was found that the extruded composites revealed superior mechanical properties as compared to as-cast composites and base metal. To determine the particle distribution and its size, scanning electron microscope (SEM) and optical microscope (OM) have been carried out for microstructural study. Also, Energy Dispersive X-ray (EDX) and X-ray Diffractometer (XRD) were studied to confirm the presence of TiB<sub>2</sub> particles in the fabricated samples. The experimental results were validated through Finite Element Analysis (FEA) using ANSYS 14. The predicted mechanical results attained by FEA are in good agreement with the experimental results.

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### 1. Introduction

Conventional aluminium monolithic material has some restraint to attain a good combination of hardness. Nowadays, Aluminium based metal matrix composites (AMMC's) reinforced with ceramic particles are being focused by researchers. This is due to better yield strength, stiffness, good dimensional stability and high specific strength. Ceramic particle such as TiB<sub>2</sub>, graphite, SiC, TiC, and Al<sub>2</sub>O<sub>3</sub> have been incorporated into aluminium matrix as reinforcement. Among these reinforced particles TiB<sub>2</sub> has been paid special attention due to its hard and stiff nature. And also, it does not react with aluminium and hence avoiding reactional by-product at the interface of reinforcement and matrix. The interface between the reinforcement and matrix play a decisive role for deciding the mechanical properties of aluminium based

composites. For a material, stiffening and strengthening depends on the load transfer across the interface [1-6].

There are several ways for synthesis of aluminium composite material. For metal matrix material, Aluminium alloy 6061 is quite far-famed. It is because of great formability in nature as well as optimal heat treatment strengthening of composite. Al/TiB<sub>2</sub> composite is difficult to fabricate and it is not available in market in higher orders as well as too costly. A constitutional inability of the casting process restricts the usage of as-cast composites and therefore, it is usually subjected to secondary working and heat treatment [7-10]. Secondary working is the common strengthening mechanisms of 6xxx series of aluminium alloys [11-12]. For concerning aluminium alloy 6xxx series, precipitation and work hardening are the common strengthening mechanisms [2]. When secondary working coupled with heat treatment process, there are two microstructural modifications are contesting with each other. First, the ductility of the alloy is improved during aging, this is due to the dislocation annihilation by work softening and hence strength of the alloy was reduced. And second, the strength of the

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# Scheduling and Load Balancing using NAERR in Cloud Computing Environment

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**Abstract:** Scheduling plays an important role in cloud computing to achieve effective load balancing by migrating tasks to partially utilized Virtual Machines (VMs). This sharing of resources provides effective scheduling in which non preemptive tasks are irretrievable constraints in cloud computing environment. Therefore, these non preemptive tasks should be initially allocated to the most suitable VMs itself. Basically, each jobs entering comprises of several interconnected tasks which may be executed by multiple VMs or different cores of a single VM. Moreover, the jobs are arrived during the server run time at random time intervals with different load conditions. In order to provide efficient cloud computing, static or dynamic scheduling techniques are used to allocate the tasks to the suitable resources and by which the involved heterogeneous resources are organized. Hence, the user satisfaction is improved. In this paper, a Novel and Adaptive Enhanced Round Robin (NAERR) algorithm is proposed which computes the size and length of all requesting jobs, the capabilities of all available VMs, and the interconnection among the tasks. The proposed and existing techniques are compared to prove the performance of the proposed algorithm.

**Keywords:** Scheduling, load balancing, cloud computing, NAERR algorithm, virtual machines.

## 1 Introduction

Cloud computing is defined as a typical computing model to manage and deliver services through the Internet. It is known as a pattern to enable on-demand, advantageous, and pervasive network access to the computing resources (for example, application, network, service, server and storage) which are in shared pool. These shared resources are frequently furnished and discharged with insignificant administration attempt or the interaction of service providers [1]. Both parallel and distributed computing concepts are integrated to produce cloud computing and it shares some of the computing resources such as software, hardware, data and other peripherals. A user can access the previously mentioned resource through cloud computing with internet facilities by paying for the period of utilization. In cloud computing technology, the virtual machines (VMs) act as a base in which executions are performed i.e. it is known as execution unit. Different applications and resources require the concept of virtualization that comprises of three phase such as formation, execution and host management. There are


few resources that are shared among the VMs in the environment of cloud computing like buses, systems and processing units, etc. Each VM can constrain its available computing resources by calculating each of its overall processing power. In such environmental model, it is unpredictable for the job arrival pattern and generally each virtual machine has different capabilities. In order to achieve better performance and stability, it is necessary to provide load balancing which becomes a complex task. Hence, it is essential to propose a novel algorithm that can enhance the network performance by providing balanced workloads among the VMs. Some of the existing load balancing algorithms is ant colony algorithm, dynamic load balancing, Equally Spread Current Execution (ESCE) algorithm, First In First Out (FIFO), round robin, throttled algorithm, Weighted Round Robin (WRR) and so forth. Among which the FIFO and WRR are the most commonly employed scheduling algorithms for processing no preemptive tasks [2]. To perform research work on cloud computing CloudSim-3.0.3 is used as the simulation environment. The cloud computing components (such as, data ware house, VMs, hosts, and

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## Disaster management using free space optical communication system

Jeyarani Jeyaseelan  D. Sriram Kumar & B. E. Caroline*Photonic Network Communications* 39, 1–14 (2020) | [Cite this article](#)508 Accesses | 4 Citations | [Metrics](#)

### Abstract

A novel method for disaster management using free space optical link is proposed in this paper. Free space optics recently gained great attention since it has advantages over RF communication such as high bandwidth, license free spectrum and highly secured transmission. Besides all these, FSO faces challenges during transmission due to atmospheric turbulence-induced fading. Diversity techniques are used in this paper to mitigate the fading effects. The capacity of multiple input multiple output (MIMO) free space optical (FSO)

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# Influence of Mechanical Properties on Modal Analysis of Natural Fiber Reinforced Laminated Composite Trapezoidal Plates

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## ABSTRACT

Present work concentrates on modal parameters of laminated composite plates composed of natural fibers reinforced with unsaturated polyester resin. The selected jute and ramie fibers underwent alkaline treatment to improve mechanical properties. Upon compression molding, the laminated composite plates such as ramie/polyester (R plate), jute/polyester (J plate) and combination of ramie and jute (RJ plate) are fabricated. The physical, mechanical and elastic properties are calculated as per ASTM standards. Using obtained elastic properties, the free undamped vibration analysis of composite plates are computed using finite element software ANSYS 18.1 for trapezoidal plates, with respect to  $a/b = 1$  and  $2$ ,  $c/b = 0.25$  to  $1$  and  $a/h = 50$ . The natural frequency and mode shape of the plates are obtained for various boundary conditions such as CFFF, CFCF, CCCC, SFSF and SSSS (C-Clamped, F-Free and S-Simply supported). The dimensionless frequency and mode shapes of R, J and RJ plates are compared with literatures which are in good agreement:

## 摘要

研究了不饱和聚酯树脂增强天然纤维复合材料层合板的模态参数。选用黄麻和苧麻纤维进行碱处理，以提高力学性能。采用模压成型的方法，制备了苧麻/聚酯（R板）、黄麻/聚酯（J板）和苧麻/黄麻组合（RJ板）等复合材料层合板。物理、机械和弹性性能按ASTM标准计算。利用获得的弹性特性，利用有限元软件ANSYS 18.1对梯形板进行了 $a/b=1&2$ ， $c/b=0.25\sim 1$ ， $a/h=50$ 的自由无阻尼振动分析。在不同的边界条件下，得到了板的固有频率和振型，如CFFF、CFI、CCCC、SFSF和SSSS（C-固支、F-自由和S-简支）。将R、J、RJ板的无量纲频率和振型与文献进行了比较，结果吻合较好。

## KEYWORDS

Composites; modal analysis; mode shape; natural fiber; non dimensional frequency parameter; finite element method; vibration analysis

## 关键词

复合材料; 模态分析; 振型; 天然纤维; 无量纲频率参数; 有限元法; 振动分析



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## Introduction

Many authors like Paramasivam and Abdul Kalam (1974), Saheb and Jog (1999), Susheel, Kaith, and Inderjeet (2009), Majesh and Pitchaimani (2016) proposed that natural fibers have been used as reinforcement instead of synthetic fibers in composites. The natural fibers can be modified or prepared according to the technical oriented applications because it possesses homogeneity of the fiber properties, degrees of elementarization and degumming, good adhesion between fiber and matrix, and cost effectiveness. Synthetic fiber like glass can induce skin irritations (Sripaiboonkij et al. 2009) and lung cancer (Maxim and Utell 2018) during composite fabrication. Natural fibers are less hazard for the people who are fabricating the composites. The uniqueness of these properties made natural fibers to become commendable material in the industrial and engineering markets. Among the natural fibers extracted from lead and





## Modelling of Ni<sub>3</sub>(Ti,V) system through first-principle calculations

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### ABSTRACT

Present study concentrates to identify the phase of stability of Ni<sub>3</sub>(Ti,V) phase through first principle calculations. Initially, enthalpy of formation of stable Ni<sub>3</sub>Ti in D0<sub>24</sub> and Ni<sub>3</sub>V in D0<sub>22</sub> structures are calculated and compared with the literature data. The stability of Ni<sub>3</sub>Ti and Ni<sub>3</sub>V phases in L1<sub>2</sub>, D0<sub>22</sub>, D0<sub>24</sub>, D0<sub>19</sub>, D0<sub>19</sub> crystal structures are compared by its calculated enthalpy of formation. Stability of Ni<sub>3</sub>(Ti,V) phase with respect to FCC crystal structures are calculated using Thermo-Calc software. To identify the possibility of formation of new intermediate phase such as Ni<sub>3</sub>(Ti<sub>1-x</sub>V<sub>x</sub>) [x = 0, 0.25, 0.5, 0.75, 1] in L1<sub>2</sub>, D0<sub>22</sub>, D0<sub>24</sub>, D0<sub>19</sub> and D0<sub>19</sub> structures, enthalpy of mixing is calculated. The result shows that Ni<sub>3</sub>Ti<sub>0.5</sub>V<sub>0.5</sub> phase is stable at D0<sub>19</sub> crystal structure than D0<sub>22</sub> and D0<sub>24</sub>.

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### 1. Introduction

The superior high temperature mechanical properties of Ni-base superalloys are primarily due to the two phase microstructure consisting of a heavily solution-strengthened fcc matrix (C), containing a high volume fraction of ordered coherent intermetallic precipitates of type Ni<sub>3</sub>X (C'). Based on the alloying element, C' precipitates can take on a wide range of crystals structures that are ordered derivatives of the FCC structure. For instance, while Ni<sub>3</sub>Al has a cubic L1<sub>2</sub> structure, Ni<sub>3</sub>Nb has an orthorhombic D0<sub>a</sub> structure and Ni<sub>3</sub>Ta has tetragonal D0<sub>22</sub> structure. The structure of the precipitate has a significant influence on the strength of the precipitate. The precipitate shape, size and its distribution in turn affects the mechanical properties of the superalloy.

A new crystal structures are observed in the ternary Ni<sub>3</sub>(Ti,V) system. While Ni<sub>3</sub>Ti has a hexagonal structure (D0<sub>24</sub>) and Ni<sub>3</sub>V has a tetragonal structure (D0<sub>22</sub>). It has further been noted that substitution of V in Ti sublattice of Ni<sub>3</sub>Ti, transforms the structure from D0<sub>24</sub> to D0<sub>22</sub> through D0<sub>19</sub>. Additionally, Zhang [1] and Morita [2] have reported the formation of stable Ni<sub>3</sub>Ti<sub>0.7</sub>V<sub>0.3</sub> phase in D0<sub>19</sub> structure at high temperatures, a hitherto undescribed

rhombohedral structure (R-phase) forms at lower temperatures. Thus it is essential to understand the stability of various geometrically close packed phases in the Ni<sub>3</sub>(Ti,V) system. In this present work, intend to address phase stability in this system via density functional theory based first principle calculations.

### 2. Methodology

#### 2.1. Structure

The geometrically closed packed structures Ni<sub>3</sub>X have various ordered FCC crystal structures such as L1<sub>2</sub>, D0<sub>22</sub>, D0<sub>24</sub> and D0<sub>a</sub>. In addition, D0<sub>19</sub> is considered due to possibility of formation of this phase reported by Morita et al. [2]. Fig. 1 shows the selected crystal structures for the present work. The crystallographic information of selected crystal structures is listed in Table 1. Due to computational cost, R phase is not considered in the current work.

#### 2.2. Computational methods

First-principles calculations are performed using the VASP software with the projected augmented wave (PAW) and the generalized gradient approximation (GGA) of the Perdew-Burke-Ernzerhof (PBE). All the structures are fully relaxed with respect to cell shape, volume, and atomic coordinates. Due to super cell calculation, kinetic cut off energy kept as 350 eV and k point spacing as

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## STRUCTURE AND PROPERTIES OF NANOSCALE AND MESOSCOPIC MATERIALS

PACS numbers: 61.66.Dk, 61.72.Qq, 62.20.Qp, 81.05.Ni, 81.20.Ev

### Investigation of Graphite Influence on Al/Fe and Al<sub>2</sub>O<sub>3</sub>/Fe Metal Matrix Composites

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Aluminium and aluminium alloy composites are a new generation metal matrix composite which have potential to satisfy the recent demands of advanced engineering applications. To improve the mechanical properties of Al/Al<sub>2</sub>O<sub>3</sub> alloys, iron and graphite reinforcements are selected for hybrid composite. To maintain the low density of the matrix, iron content is fixed as 4% wt. and graphite content is varied from 5 to 8% wt. Using optimized compaction load and sintering temperature, the Al–Fe–Graphite and Al<sub>2</sub>O<sub>3</sub>–Fe–Graphite hybrid composites are fabricated by powder metallurgy process. The elemental powders and sintered products are characterized with the help of X-ray diffraction and scanning electron microscopy. The addition of graphite not only increases the density, it also increases the hardness of the hybrid composites. In comparison with Al hybrid composites, the Al<sub>2</sub>O<sub>3</sub> hybrid ones have better mechanical property.

**Key words:** Al and Al<sub>2</sub>O<sub>3</sub> alloy, graphite contained hybrid composite, mechanical property, powder metallurgy.

Композити на основі алюмінію та алюмінієвих сплавів є металевими матричними композитами нового покоління, які можуть задовольнити останні вимоги новітніх інженерних застосувань. З метою поліпшення механічних властивостей сплавів Al/Al<sub>2</sub>O<sub>3</sub> для гібридних композитів використо-

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**Job satisfaction after privatisation of higher education: A study with reference to selected Arts & Science Colleges Affiliated to Bharathidasan University, Trichy, Tamil Nadu, India**

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**Abstract**

“There are many studies in India and abroad which examine the job satisfaction of teachers. These studies dealt with job satisfaction and the factors which affect job satisfaction in schools, Government Colleges.” However, virtually none of these studies were concerned with private college teaching faculty satisfaction. The present study deals with the job satisfaction among the teaching faculties of self-financing Arts and Science Colleges affiliated to Bharathidasan University, Tiruchirappalli. The results show that, 54% of the respondents have low satisfaction and 46% of the respondents have high job satisfaction. The gap between job satisfaction and dissatisfaction is only at a negligible among the teaching faculty in the study area.

**Key words:** Compensation, infrastructure, Job satisfaction, Self financing college and Workplace condition

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# Deformation analysis of suspended type cut off wall of diversion structures

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## ABSTRACT

Numerical study is carried out to analyse the behaviour of cut off walls in sandy soil, under constant differential pressure head, by varying its location from upstream end to downstream end. The deformation and bending moment in cut off wall are at their lowest magnitude when the cut off wall is positioned at upstream end. The cut off wall is subjected to second lowest deformation, when it is positioned at downstream end. The maximum deformation occurs, when the cut off wall is positioned at 0.60 times the total width of diversion dam from upstream end. The seepage rate in the diversion dam is highest when the cut off wall is positioned at centre of the diversion dam. The seepage rate in the diversion dam is having direct relation with the maximum displacement and maximum bending moment. The seepage force found to be more predominant than the pressure gradient and active pore pressure variations in deforming the cut off walls of diversion dams.

## 1. Introduction

The hydraulic structure like diversion structures are constructed across river in permeable foundations. The impounded water on the upstream side of diversion structures seep through the foundation soil (see Fig. 1). This seepage flow tends to destabilize the diversion structure. Therefore, the seepage through foundation soil measured and analyzed with the parameters; seepage rate, uplift force and exit gradient. These parameters are controlled to increase the factor of safety of the diversion structure. Formation of cut off wall is the one of the controlling technique of these destabilizing parameters. These cut off walls formed to certain depth of pervious stratum, not to its full depth. Hence, these walls act as partial seepage barriers and looks like, as if, suspended from the apron. Seepage flow from upstream of diversion structure to downstream of it, due to the differential pressure head created by the impounded water. This line of seepage is creep line and length of this seepage path is creep length.

Bligh [1] introduced the creep length theory for seepage passing from upstream to downstream. According to Bligh [1], creep length is the first line of contact on foundation of structure. This creep length theory, also states that the loss in energy occurs along the creep length uniformly, so the uplift pressure distribution along the creep length is uniform irrespective of the vertical or horizontal creep path. Lane [2] has brought

advancement over the Bligh's [1] creep length theory and assigned different weightage to horizontal and vertical creep length. Lane [2] prescribed 0.33 weightage for horizontal path and 1.0 weightage for vertical path. The total creep length included vertical and horizontal percolation length based on the weightage. Khosla et al [3] introduced an improved method to assess the uplift pressure on hydraulic structures with pervious foundations. This method is based on concept of "flow net" comprising seepage lines (streamline flow from upstream to downstream) and equipotential lines crossing each other orthogonally.

Various research studies carried out using both numerical and experimental models to study the cut off walls for their hydraulic behaviors for various changes in structural configurations and soil parameters. Moharami et al [4], Kumar et al. [5], King and Collins [6], Shayan and Tokaldany [7] and Alsenousi and Mohamed [8] conducted studies using various configuration of cut off walls. They studied the effects on seepage rate, exit gradient variations and uplift pressure variations for various configuration of cut off wall. As these parameters affects the factor of safety of the structure, they need due attention while designing diversion structures. However, these studies orient on the hydraulic requirements of the cut off walls, not on the structural requirements of it.

Rice and Duncan [9] reported that the seepage barriers likely to develop crack due to the differential water pressure head acting on the barrier. Rice and Duncan [10] also reported that the pore pressure regime

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# Structural Performance of Concrete Beams with Micro-reinforcement Strengthened with GFRP Laminates under Monotonic Loading

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### Abstract

The behavior of structural elements under different loading conditions decides the performance of the built structures. Fiber-reinforced concrete and fiber-reinforced polymers (FRPs) have received increasing attention in recent years for many structural applications. Steel fibers, when added into concrete as micro-reinforcement, impart a bridging effect, resulting in enhanced mechanical properties. FRPs are most commonly composed of glass, aramid, or carbon fibers in a polymeric matrix and can be tailor-made to provide a large variety of material properties to suit the prerequisites of the engineer. This article presents an experimental investigation of steel fiber reinforced concrete beams externally strengthened with glass fiber reinforced polymer (GFRP) laminates to study their static flexural behavior and failure modes. The experimental program consisted of six concrete beams strengthened with GFRP laminates, and one concrete beam was left unstrengthened to serve as the control beam. The beams were designed for under-reinforced conditions and cast with different fiber volume fractions ( $V_f$ ) and GFRP laminate thickness ( $t_f$ ). The beams were tested under monotonic loading until failure. The experimental results showed that the strengthened beams exhibit significantly improved performance compared with the control beams in terms of strength, deformation, ductility, and crack resistance under monotonic loads.

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Research Paper

# Numerical study on deformation of diaphragm cut off walls under seepage forces in permeable soils

S. Sivakumar<sup>a</sup> ✉, N. Almas Begum<sup>b</sup>, P.V. Premalatha<sup>c</sup>

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## Abstract

Numerical modelling using Plaxis-2D is carried out to study seepage forces on suspended type cutoff walls in highly permeable soils. On increasing differential pressure head, deformation and bending moment in cutoff walls

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The behavior of structural elements under different loading conditions decides the performance of the built structures. Fiber-reinforced concrete and fiber-reinforced polymers (FRPs) have received increasing attention in recent years for many structural applications. Steel fibers, when added into concrete as micro-reinforcement, impart a bridging effect, resulting in enhanced mechanical properties. FRPs are most commonly composed of glass, aramid, or carbon fibers in a polymeric matrix and can be tailor-made to provide a large variety of material properties to suit the prerequisites of the engineer. This article presents an experimental investigation of steel fiber reinforced concrete beams externally strengthened with glass fiber reinforced polymer (GFRP) laminates to study their static flexural behavior and failure modes. The experimental program consisted of six concrete beams strengthened with GFRP laminates, and one concrete beam was left unstrengthened to serve as the control beam. The beams were designed for under-reinforced conditions and cast with different fiber volume fractions ( $V_f$ ) and GFRP laminate thickness ( $t_f$ ). The beams were tested under monotonic loading until failure. The experimental results showed that the strengthened beams exhibit significantly improved performance compared with the control beams in terms of strength, deformation, ductility, and crack resistance under monotonic loads.

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## STUDY OF PARTIALLY EMBEDDED MONOPILE SUBJECTED TO TRAVERSE LOAD ON PILE AXIS IN LAYED SOIL

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### ABSTRACT

*Piles are structural members, transmitting overburden loads to lower stratum of the earth for anchorage and stability of structures. Piles carrying designed loads are also exposed to continuous loading forces vertically, laterally and by overturning moment due to the wind, wave and other agents. Natural causes many times make lateral forces traversing over the pile axis and make lateral loads acting at various points on the axis of the pile. When acted upon different points over the axis, behaviour of pile also tends to vary. Understanding of soil-pile interaction under the movement of lateral load vertically over the axis of the pile will be useful in better pile designing. Hence a study is attempted to explore the behaviour of the pile under traversing lateral load condition. The behaviour of the pile, when the load is acting below and above ground level is also studied. The study shows that lateral load moving over the axis has a significant effect on the pile behaviour.*

**Key words:** Lateral Load, Laterally loaded pile on axis, laterally loaded mono-pile, Numerical Modelling, Finite Element Method, Plaxis 2D Analysis.

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Volume 46, Issue 2

## Assessment of Radioactivity in Concrete Made with e-Waste Plastic

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### Abstract

The paper reports the impact of e-waste plastic [high-impact polystyrene (HIPS)] mixing in concrete on its radioactivity profile. The concrete was prepared with HIPS as a partial replacement for coarse aggregate in varying percentages by volume and radioactivity concentrations of  $^{238}\text{U}$ ,  $^{232}\text{Th}$ , and  $^{40}\text{K}$  were measured using gamma-ray spectrometer and radon activity by solid state nuclear track detector (SSNTD) technique. Both gamma radiation and radon activity in standard concrete and concrete with HIPS were well within the permissible limit. However, the gamma-radiation level and radon activity decreased with an increase in HIPS content of the concrete. The study concludes that the concrete with HIPS does not pose any

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Both gamma radiation and radon activity in standard concrete and concrete with HIPS were well within the permissible limit. However, the gamma-radiation level and radon activity decreased with an increase in HIPS content of the concrete. The study concludes that the concrete with HIPS does not pose any radiation hazard and, hence, is suitable as a construction material.

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## BEHAVIOR OF PARTIAL SEEPAGE BARRIERS IN HIGHLY PERMEABLE SOILS

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### ABSTRACT

*Numerical analysis is carried out to study the deformation of partial seepage barriers in highly permeable soil. Plaxis 2D software is used to analyze the chosen numerical model of a diversion dam with suspended type diaphragm cut off walls formed in sandy soil. The depth of downstream cutoff wall and differential pressure head across the diversion dam are kept constant. The depth of upstream cutoff wall is made to vary from 0m to 15m and consequent effect on deformation pattern of downstream cutoff wall is studied. On increasing the depth of upstream cut off wall, the deformation at top end of downstream cutoff wall reduces at decreasing rate up to 9m depth and beyond that it increases at increasing rate. However, the bottom end deformation reduces almost uniformly throughout. On increasing the depth of upstream cutoff wall, the pressure head acting on downstream cutoff wall decreases but deformation increases. This increase is due to the seepage dynamic force acting on the seepage barriers despite the reduction in pressure head acting on them. On increasing the depth of upstream cutoff wall, the direction of stream flow gets mostly oriented from downward to horizontal direction, thereby increasing the magnitude of horizontal component of seepage forces acting on the downstream cutoff wall and exerts dynamic force which is more predominant than the pressure head acting on seepage barrier.*

**Keywords:** Diaphragm cutoff wall, Numerical modeling, Partial seepage barrier, Seepage force, Suspended type cutoff wall.

**Cite this Article:** S. Sivakumar, N. Almas Begum and P.V. Premalatha, Behavior of Partial Seepage Barriers in Highly Permeable Soils, International Journal of Civil Engineering and Technology, 9(2), 2018, pp. 286–298.  
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# A Comparison of Geopolymer Concrete Blended with Steel Slag under Sunlight and Ambient Curing

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## ABSTRACT

In the present context, global warming is one of the greatest environmental issues. The production of one ton of PC emits approximately one ton of CO<sub>2</sub> into the atmosphere. Geopolymer concrete is an innovative concrete and is produced by totally replacing PC. This study seeks to optimize the benefits of using steel slag in Geopolymer concrete. Steel slag is used in different percentages such as 2%, 2.5%, 3%, and 3.5%. Alkaline solution to fly ash at a ratio of 0.5 is used. The casted cubes were cured in ambient curing and sunlight curing. The cube specimens were tested at 7, 14 and 28 days. The results were analyzed. The compressive strength was compared in two different mediums of curing for different percentage of addition of steel slag in concrete. The conclusions are drawn on the effect of steel slag in the Geopolymer concrete. The results obtained shows improved compressive strength by addition of steel slag and that the sunlight curing increases compressive strength of the concrete compared to ambient curing.

Keywords: Fly ash, Geopolymer concrete, Alkaline solution and Steel slag.

## 1. INTRODUCTION

Concrete is the most widely used material in the world after water because of its versatile application. In the present context, global warming is one of the greatest environmental issues. Global warming is caused by the emission of greenhouse gases like CO<sub>2</sub> to the atmosphere. It has been reported that the worldwide cement industry contributes around 1.65 billion tons of the greenhouse gas emissions annually (Malhotra, 2002; McCaffrey, 2002; Hardjito et al., 2004). The production of one ton of PC emits approximately one ton of CO<sub>2</sub> into the atmosphere (Davidovits, 1994c; McCaffrey, 2002). Due to the production of PC, it is estimated that by the year 2020, emissions will rise by about 50% from the current levels (Naik, 2005; Salloum, 2007).

In order to reduce the environmental impact due to cement production, it is necessary to develop a new type of binder. In this respect, the geopolymer technology proposed by Davidovits (1978) is one of the revolutionary developments resulting in a low-cost and greener substitute for PC.

Geopolymer concrete is an innovative binder material and is produced by totally replacing PC. It is an alkali-activated binder produced by a polymeric reaction of alkaline liquids with the silicon and the aluminium oxides in source materials of geological origin like metakaolinite (calcined kaolinite) or by-product materials such as fly ash and rice husk ash (Davidovits, 1999). Therefore, it not only helps to generate less CO<sub>2</sub> than PC but also reuses industrial waste and or by-products of alumino-silicate composition to produce added-value construction material products (Malhotra, 2002; Davidovits, 2005). Use of fly ash in concrete production not only reduces greenhouse gas emissions but also the water requirement for mix design, the energy needed to produce concrete and it creates longer-lasting, more durable products that do not have to be replaced frequently. Thus, the proper utilization preserves hundreds of thousands of acres currently used for the disposal of coal combustion products, as



## EFFECTS OF DEPTH VARIATIONS IN DEFORMATION OF CUTOFF WALLS

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### ABSTRACT

*Numerical analysis is conducted to study the effect of depth variations in downstream cutoff wall on deformation pattern of upstream cutoff wall. Keeping constant the depth of upstream cutoff wall, depth of the downstream cutoff is made to vary with applied constant differential pressure head. It is observed that on increasing the depth of downstream cutoff wall, displacement at upstream cutoff wall top end increases and at bottom end decreases. On increasing the depth of downstream cutoff wall, pore pressure at the inner side of cutoff wall-apron junction increases and leads to higher uplift pressure acting on the apron. The rate of increase of pore pressure in apron - downstream cutoff wall junction is more than that of apron -upstream cutoff wall junction. On increase of depth of downstream cutoff wall the maximum bending moment in the upstream cutoff wall increases and the point of occurrence of maximum bending moment shifts towards top end. Maximum shear force and normal force on the upstream cutoff wall decreases on increasing the depth of downstream cutoff wall. Maximum shear force acts at top end and the maximum normal force acts at 0.40 times the depth of upstream cutoff wall from its top end for all variations in depth of downstream cutoff wall.*

**Keywords:** Partial seepage barriers, Cutoff wall, Seepage flow, Seepage force, Suspended type cutoff wall.

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# Generating Organic Manure (Compost tea) by Vegetable Waste

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**Abstract**—There is an urgent need to standardize compost tea production method using kitchen waste from CARE Group of Institutions hostel and application rates as far as possible to increase their effectiveness, avoid adverse effects and decrease human and environmental potential hazards. Most of the evidence on their effectiveness in plant growth enhancement or disease suppression is anecdotal. There have been few well-designed experimental trials or scientific reports that assess their effectiveness or focus on finding optimal production methods or application rates. There are also very few reports on possible mechanisms by which they promote plant growth or suppress plant diseases. Intensive use of chemical fertilizer in agriculture increases the crop production but at the same time it causes negative impact on land, air, water and on environmental health. Concerns regarding soil degradation and agricultural sustainability have kindle interest in assessment of soil quality. Soil quality refers to capacity of soil to accept, store and recycle nutrients and water so that economic yields or obtain without deterioration of environmental quality.

## I. INTRODUCTION

Until recently compost tea has been defined simply as a liquid extract from composted material that may contain organic and inorganic soluble nutrients, and a large number of organisms including bacteria, fungi, protozoa and nematodes (ROU, 2003b).

Intensive use of chemical fertilizer in agriculture increases the crop production but at the same time it causes negative impact on land, air, water and on environment health. Concerns regarding soil degradation and agricultural sustainability have kindle interest in assessment of soil quality. Most of the evidence on their effectiveness in plant growth enhancement or disease suppression is anecdotal. Human beings mainly such as **Children's and foetuses are most vulnerable** to pesticide exposure because their immune systems, bodies, and brains are still developing. Exposure at an early age may cause developmental delays, behavioural disorders, autism, immune system harm, and motor dysfunction so that organic food is important need in day to day life.

Massive Vegetable wastes from the markets and kitchens will create an unpleasant odour and spoiling the soil characteristics. The market wastes are collected through the municipality and then it is simply dumped into the landfills and its leaching highly affect the environment. The following images shows that the vegetable wastes and their effects.

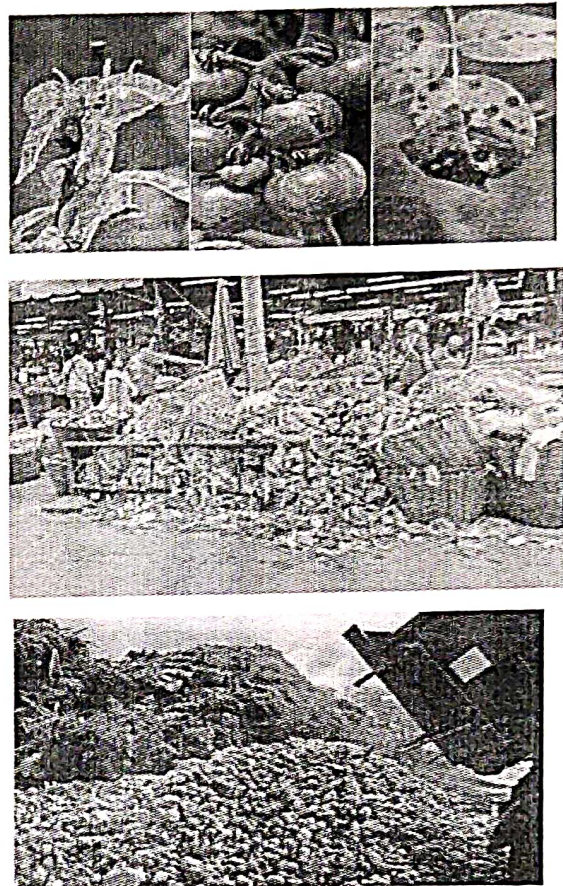


Figure 1 Vegetable Wastes and their effects

**Compost leachate** is the dark coloured solution that leaches out of the bottom of the compost pile (compost windrow leachate). This leachate is most likely rich in soluble nutrients, but in the early stages of composting it may contain pathogens (Diver, 2002). Compost leachate needs further bioremediation and is not suitable as a foliar spray.

**Compost extract** is a centuries old technique in which compost is suspended in a barrel of water for 7 to 14 days, usually soaking in a sack (Diver, 2002). The primary benefit of the extract is to provide a supply of soluble nutrients that can be used as a liquid fertiliser.

Compost tea is made by two different methods:

- Non-aerated method; and
- Aerated method.

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# Decolourisation of Tannery Effluent by Electrochemical Oxidation

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**Abstract**— Tannery effluents are of large-scale environmental concern because they colour and diminish the quality of water bodies into which they are released. The wastewater is highly coloured and viscous due to dyestuff and suspended solids respectively. Sodium is the only major cation due to high consumption of sodium salts in processing units, chloride is the major anion found in the wastewater, the concentrations of bicarbonate, and sulphate and nitrate are also high. Electrochemical oxidation for a tannery wastewater collected from Common Effluent Treatment Plant investigated using Palladium based triple oxide coated Titanium as an anode and Stainless Steel as a Cathode. Several batch experiments run in a laboratory-scale and characteristics were analyzed at different time intervals, for a total period of 180 min. The results were reported in terms of percentage removal of Chemical Oxygen Demand (COD), Colour, pH, Total Dissolved Solids (TDS), Electrical conductivity, Chlorides and Sulphates for current density of 20V and different pH. For the pH and Contact time decolourised the Secondary Treated Effluent and RO rejects and Other Pollutants also get reduced.

## I. INTRODUCTION

The waste water discharged from industries such as textile, leather, dye manufacturing units have been of a major environment concern for many years, due to its refractory nature colour, toxicity and high level of COD and BOD. Tannery industries use a large number of chemicals (i.e., natural and synthetic tanning agents, surfactants, salts, etc.) for the treatment of skins and consequently produce large quantities of effluents which have to be purified before being discharged into the environment. Since tannery wastewater contains both organic compounds, mainly tannins that are polyphenol molecules and inorganic compounds such as ammonia, sulphides, and chlorides the combination of physicochemical primary treatments (e.g., coagulation, flocculation, sedimentation, or precipitation) and secondary biological processes do not always meet the legal limits for waste discharge. During process of retanning, dyeing, and fat-liquoring to impart special properties to the leather, increase penetration of tanning solution, replenish oils in the hides, and impart colour to the leather and its effluents are BOD, COD, chromium, Vegetable Tans, Syntans, Dyes, Fat. The establishment and enforcement of limits for the discharge and disposal of toxic and hazardous materials has required the development of advanced technologies to effectively treat a variety of gaseous and liquid effluents, solid waste and sludge. Conventionally effluents containing organics are treated with adsorption, biological oxidation, coagulation, etc. Though the conventional methods have individual advantages, they are

lacking of effectiveness if applied individually. Due to the large variability of the composition of tannery wastewater, most of the traditional methods are becoming inadequate. As environmental regulations become stringent, new and novel processes for efficient treatment of various kinds of wastewater at relatively low operating cost are needed. In this context, researchers are trying various alternative processes, such as electrochemical technique, wet oxidation, ionization, photo catalytic method for the degradation of organic compounds. Among these advanced oxidation processes, the electrochemical treatment has been receiving greater attention in recent years due to its unique features, such as versatility, energy efficiency, automation and cost effectiveness.

The electrochemical technique offers high removal efficiencies and has lower temperature requirements compared to non-electrochemical treatment. The mechanism of electrochemical oxidation of wastewater is a complex phenomenon involving coupling of electron transfer reaction with a dissociate chemisorption step. Basically, two different processes occur at the anode. On anode having high electro-catalytic activity, oxidation occurs at the electrode surface (direct electrolysis); on metal oxide electrode, oxidation occurs via surface mediator on the anodic surface, where they are generated continuously (indirect electrolysis). In direct electrolysis, the rate of oxidation depends on electrode activity, pollutants diffusion rate and current density. On the other hand, temperature, pH and diffusion rate of generated oxidants determine the rate of oxidation in indirect electrolysis.

## II. METHODOLOGY

The decolourisation studies conducted at the Unit Operations and Process Engineering Laboratory of the Centre for Environmental Studies, Anna University. Secondary treated tannery effluent and RO rejects from the Tannery Common Effluent Treatment Plant at Pallavaram used for the studies. First step was to collect the samples of secondary treated effluent and RO rejects from the CETP for characterization. Immediately after collection, the sample preserved and analyzed for Colour, pH, TDS, Electrical conductivity, BOD, COD, Chlorides and Sulphates in the Analytical laboratory of Centre for Environmental studies, Anna University.

### A. Methodology for Effluent Characterisation

Colour Spectrometry in the visible region was used as the method for measurement of colour. This method of



## Job Scheduling In Cloud Computing Based On Adaptive Job Size Based Queuing Process

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### Abstract

Cloud computing is one of the most emerging distributed technology. It enables remotes accessing, storing, retrieving and processing of data from anywhere anytime. The main feature of this cloud technology is resource sharing at highly reliable and securable mode. The vast usage of this technology with several features had a greater impact, especially in the need for efficient methodology in resource management. Generally, there are two main components in cloud computing such as task scheduling and resource allocation. In the cloud, the major process is the computing of remote data centers. Resource scheduling and task execution are one of the major problems that still exist. It needs effective resource utilization that is assigning of available resources according to the request equally. The major issue still existing in cloud computing is time and computation cost. In this paper, we propose an Adaptive Work Size Based Queuing Process (AWSQP), this enables quick data access to the virtual machine (VM's). The main principle is to achieve quick processing, task priority and minimum sized task are taken for the queue. At the same time, the task is executed within the deadline but without increasing the cost. Our proposed mechanism AWSQP works effectively based on the data size and chooses the best cost-effective path. The data access completion time is evaluated by the request/response time along with the mean and variance of the network service time. Then AWSQP applies the best path for the task with high priority and continues the same for the entire queue. Based on the proposed task scheduling mechanism, an experiment is conducted between CETS, ACTS, and AWSQP on the aspects of computation cost, communication cost, execution time, CPU utilization and bandwidth. The obtained results prove that achieved performance by AWSQP is far better than the existing approaches.

**Keywords:** Cloud computing, Communication, Virtualization, and Task scheduling

### 1. Introduction

Cloud computing technology is an art-of- service which enables the organizations to compute several resources like a virtual machine (VM), storage, etc. Apart from local storage, it provides cloud-based storage which enables remote database processing. Using web-based tools, these cloud-based services are retrieved using the internet. In the cloud environment, the cloud computing process works on Service-oriented architecture [11]. Cloud models are of different types such as public, private, hybrid and community cloud. The various cloud services are IaaS (Infrastructure-as-a-Service), PaaS (Platform-as-a-Service), SaaS (Software-as-a-Service) and Taas (Testing-as-a-service). In PaaS, the cloud offers a development platform it includes language execution environment, operating system, database, programming, and the webserver. SaaS provides multiple software and applications on a pay-per-use basis. IaaS are online services that offer high-level APIs and infrastructures like physical computing resources, scaling, security, backup, data





# An Efficient Approach on Constant Human Motion Detection in Surveillance

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**Abstract**-- Video handling is a standout amongst the most difficult zones in picture preparing. It manages distinguishing a protest of intrigue. Movement identification has been utilized as a part of numerous fields either straightforwardly or by implication. In this paper a proficient way to deal with continuous movement recognition in video observation utilizing shading highlight extraction administrator. Utilizing this approach, we enhance the foundation subtraction and recognizing the moving item with more noteworthy precision. In this paper, foundation demonstrating is done keeping in mind the end goal to make the refresh of foundation because of light brightening and change in the climate condition. Forefront identification is done before refreshing the foundation demonstrate. Shading highlight extraction is done with a specific end goal to keep away from the dynamic foundation, for example, moving leaves, rain, snow, undulating water

**Keywords:** Motion detection, background subtraction, background modeling, dynamic background

## I. INTRODUCTION

Moving object detection is the basic step for further analysis of video. It handles segmentation of moving objects from stationary background objects. Commonly used techniques for motion detection are background subtraction, statistical methods, temporal differencing and optical flow. Due to dynamic environmental conditions such as illumination changes, shadows and waving tree branches in the wind, object segmentation is a difficult and significant problem that needs to be handled well for a robust visual surveillance system.

Object classification step categorizes detected moving objects into predefined classes such as human, vehicle, clutter, etc. It is necessary to distinguish objects from each other in order to track and analyze their actions reliably. There are two major approaches toward moving object classification: shape-based and motion-based methods. Shape-based methods make use of object's 2D spatial information whereas motion-based methods use temporal tracked features of objects for the classification solution. The next step in the video analysis is tracking, which can simply be defined as the creation of temporal correspondence among detected objects from frame to frame. This procedure provides temporal identification of the segmented regions and generates cohesive information about the objects in the monitored area. The output produced by the tracking step is generally used to support and enhance motion segmentation, object classification and higher level activity analysis. The final step of the fully automatic video

surveillance systems is to recognize the behaviors of objects and create high-level semantic descriptions of their actions. The outputs of these algorithms can be used both for providing the human operator with high level data to help him make the decisions more accurately and in a shorter time, and also for offline indexing and searching stored video data effectively.

In this paper, we aimed to design an efficient algorithm to extract moving objects in surveillance. The key of background subtraction is to build and maintain a background model to represent the background of a video, which is a challenging task owing to that backgrounds of scenes in real-life are usually dynamic, including noise, illumination changes, swaying trees, rippling water and so on

## II. RELATED WORK

Feature based detection is based on identifying the points of interest in an image such as edges, corners, color compositions, blobs, their points (corners) and ridges. Feature based methods are generally implemented on individual images rather than a sequence of images. The core algorithm in these methods being divided into two categories, 1) extract features 2) classify these features and trains a system for recognition and classification. Feature (specific structures such as points, edges, curves, boundaries etc.) selection is very important as the rest of the algorithm depends on how good the features are detected [4]. Background subtraction is particularly a commonly used technique for motion segmentation in static scenes [2]. It attempts to detect moving regions by subtracting the current image pixel-by-pixel from a reference background image that is created by averaging images over time in an initialized period. The pixels where the difference is above a threshold are classified as foreground. After creating foreground pixel map, some morphological post processing operations such as erosion, dilation and closing are performed to reduce the effects of noise and enhance the detected regions. The reference background is updated with new images over time to adapt to dynamic scene changes.

There are different approaches to this basic scheme of background subtraction in terms of foreground region detection, background maintenance and post processing. In [3], Heikkila and Silven used the simple version of this scheme where a pixel location  $(x, y)$  in the current image  $I$  is marked as foreground if the inequality is satisfied,

$$|I_t(x, y) - B_t(x, y)| > \tau$$



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## Optimisation of free vibration analysis on structural plates of fibre reinforced laminated composites

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**Abstract:** The present work deals with optimisation of free vibration of fibre reinforced composite rectangular plates. In this investigation, Eglass/epoxy and Jute/epoxy rectangular plates were fabricated using hand lay-up technique. Experimental mechanical testing was done as per ASTM standard for the plates and elastic properties such as Young's modulus, Poisson's ratio and shear modulus were carefully calculated from the test data. For the same specimens, elastic properties were derived using analytical method by rule of mixture and Chamis model. These data were fed into finite element analysis in ANSYS software to find the natural frequencies and mode shapes. Finite element analysis as the result of experimental mechanical testing and analytical model for both plates were compared and dynamic characteristics were discussed elaborately. The effects on aspect ratio ( $a/b = 3.75, 7.5$ ) for both plates on natural frequency were studied experimentally using hammer method. Finally the cause for the difference in natural frequency and mode shapes were justified with available data.

**Keywords:** vibration analysis; finite element analysis; glass/epoxy composite; jute/epoxy composite; optimisation.

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# INFLUENCE OF NATURAL FIBER POWDERS WITH CARBOXY METHYL CELLULOSE ON MECHANICAL AND PHYSICAL PROPERTIES OF LAMINATED PLATE

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**Abstract** – The project work deals with mechanical and physical behavior of composites plate made of coconut shell powder, palm kernel powders and carboxy methyl cellulose. The composite plate is fabricated using hand layup method at different proportions of coconut shell powder, palm kernel powder and carboxy methyl cellulose. As per ASTM Standards, tensile strength, hardness, total dissolved solid test, biodegradable test, water soluble test are conducted and the properties are compared with available literatures.

**Key Words:** Acetic Acid, Coconut Shell Powder, Carboxy methyl cellulose using Hand layup method

## 1. INTRODUCTION

Materials required for this composite are coconut shell powder and Palm kernel powder and CMC. chemical composition of coconut shell powder consists of Lignin (29.4%), Pentosans (27.7%), Cellulose (26.6%), Moisture (8%), Solvent Extractives (4.2%), Uronic Anhydrides (3.5%) and Ash (0.6%). The cleaned coconut shell were dried in open air, pulverizing machine is used to make coconut shell into powder. The idea of composite materials is not a new or recent one. Nature is full of examples wherein the idea of composite materials is used. The coconut palm leaf, for example, is nothing but a cantilever using the concept of fiber reinforcement. Wood is a fibrous composite: cellulose fibers in a lignin matrix. The cellulose fibers have high tensile strength but are very flexible (i.e. low stiffness), while the lignin matrix joins the fibers and furnishes the stiffness. Bone is yet another example of a natural composite that supports the weight of various members of the body. It consists of short and soft collagen fibers embedded in a mineral matrix called apatite. In addition to these naturally occurring composites, there are many other engineering materials that are composites in a very general way and that have been in use for very long time. The carbon black in rubber, Portland cement or asphalt mixed with sand, and glass fibers in resin are common examples. Thus, we see that the idea of composite materials is not that recent. Nevertheless, one can safely mark the origin of the distinct discipline of the composite materials as the beginning of the

1960s. It would not be too much off the mark to say that a concerted research and development effort in composite materials began in 1965. Since the early 1960s, there has been an increasing demand for materials that are stiffer and stronger yet lighter in fields as diverse as aerospace, energy and civil constructions. The demands made on materials for better overall performance are so great and diverse that no one material can satisfy them. This naturally led to a resurgence of the ancient concept of combining different materials in an integral-composite material to satisfy the user requirement. Such composite material systems result in a performance unattainable by the individual constituents, and they offer the great advantage of a flexible design; that is, one can, in principle, tailor-make the material as per specifications of an optimum design.

The tensile strength of natural fibers is substantially lower than that of glass fibers though the modulus is of the same order of magnitude. However, when the specific modulus of natural fibers (modulus per unit specific gravity) is considered, the natural fibers show values that are comparable to or even better than glass fibers. Material cost savings, due to the use of natural fibers and high fiber filling levels, coupled with the advantage of being non-abrasive to the mixing and molding equipment make natural fibers an exciting prospect. These benefits mean natural fibers could be used in many applications, including building, automotive, household appliances, and other applications. This chapter outlines some of the recent reports published in literature on composites with special emphasis on mechanical properties of Natural Fiber Reinforced Polymer Matrix Composites. As a result of the increasing demand for environmentally friendly materials and the desire to reduce the cost of traditional fibers (i.e., carbon, glass and aramid) reinforced petroleum-based composites, new bio-based composites have been developed. Researchers have begun to focus attention on natural fiber composites (i.e., bio composites), which are composed of natural or synthetic resins, reinforced with natural fibers. Natural fibers exhibit many advantageous properties, they are a low-density material yielding relatively lightweight composites with high specific properties. These fibers also offer significant cost advantages and ease of processing along with being a highly





# Spectroscopic (FT-IR, FT-Raman, NMR) investigations, MEP and Magnetic Susceptibility of 2,3-diphenyl-5-(thiophen-2-ylmethylidene)-2,5-dihydro-1,2,4-triazin-6(1H)-one

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Magnetic susceptibility.

## ABSTRACT

In the present work, a combined experimental and theoretical study on ground state molecular structure, spectroscopic and nonlinear optical properties of the thiophene derivative 2,3-diphenyl-5-(thiophen-2-ylmethylidene)-2,5-dihydro-1,2,4-triazin-6(1H)-one is reported. The entire quantum chemical calculations and optimized structural parameters like bond lengths and bond angles, vibrational frequencies and optimized geometry have performed at DFT/B3LYP method with cc-pVDZ and cc-pVTZ basis sets using the Gaussian 09W program package. The calculated results show that the optimized geometry parameters, the theoretical vibrational frequencies and chemical shift values show good agreement with experimental values. The FTIR and FT Raman spectra of the title compound have been recorded in the regions 4000 – 400 cm<sup>-1</sup> and 3500 – 100 cm<sup>-1</sup>, respectively. The calculated harmonic vibrational frequencies have been compared with experimental FT-IR and FT-Raman spectra. The observed and calculated frequencies are found to be in good agreement. In addition, Mulliken atomic charges, local reactivity descriptors such as local softness (sk), Fukui function (fk), global electrophilicity and nucleophilicity of the title compound were calculated and discussed. Besides HOMO-LUMO energy gap and molecular electrostatic potential map were performed. <sup>1</sup>H and <sup>13</sup>C NMR isotropic chemical shifts are evaluated experimentally. Magnetic susceptibility has been determined for various range of temperature.

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## 1. Introduction

Thiophene is one of the most studied heterocycles: it is easy to process, chemically stable, and its synthetic applications have been a constant matter of investigation for many years [1]. Thiophene belongs to a class of heterocyclic compounds containing a five-membered ring made up of one sulphur as heteroatom with the formula C<sub>4</sub>H<sub>4</sub>S [2]. In medicinal chemistry, thiophene derivatives have been very well known for their therapeutic applications. The normal thiophenes are stable liquids which is very similar to the benzene compounds in the character like boiling point and in smell [3]. Thiophene has a structure that is analogous to structure of pyrrole, and due to pie electron cloud, it behaves like extremely reactive benzene derivative. [4] In most cases, the 2<sup>nd</sup> and 5<sup>th</sup> position of thiophene are used for the polymerization [5]. The modification of the molecules for special electronic properties is operated on the 3<sup>rd</sup> and 4<sup>th</sup> - positions [6]. Thiophenes are part of many organic compounds [7] having vast applications in the field of electronics and optoelectronics, medicine and materials [8-10]. The remarkable pharmacological efficiency of the compounds containing a thiophene ring in their structure is known for their antidepressant, anticonvulsant, antihistaminic, anaesthetic, antipuritic, analgesic action [11].

Thiophene and its derivatives exhibit diverse biological properties such as nemotocidal [12], insecticidal [13], antibacterial, antifungal, antiviral and antioxidant activity [14].

Density functional theory (DFT) approaches, especially those using hybrid functional, have evolved to a powerful and very reliable tool, being routinely used for the determination of various molecular properties [15]. B3LYP functional has been shown to provide an excellent compromise between accuracy and computational spectra for molecules of large and medium size [16, 17]. The aim of the present study is to give a complete description of the molecular geometry and molecular vibrations of the title molecule. For that purpose, quantum chemical computations were carried out on title molecule using DFT. The calculated HOMO (Highly occupied molecular orbital's) and LUMO (Lowest Unoccupied molecular orbital's) energies show that charge transfer occurs in the title molecule. DFT calculations are characterised to give very good vibrational frequencies of organic compounds if the calculated frequencies, are scaled to indemnify correlation, for basis set deficits and for not simple harmonic [18-20].



# VIBRATIONAL SPECTRAL ANALYSIS OF METHYL (2Z)-2-(BENZOYLAMINO)-3-(THIOPHENE-2-YL) PROP-2-ENOATE

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## ABSTRACT

The spectroscopic studies of the methyl (2Z)-2-(benzoylamino)-3-(thiophene-2-yl) prop-2-enoate (MBTPE) have been accounted using the experimental techniques and tools derived from quantum chemical calculations. It was synthesized and characterized by FT-IR and FT-Raman. The vibrational frequencies were obtained by DFT/B3LYP method with 6-31G and 6-311G as basis sets using the Gaussian 09W program. The calculated and observed frequencies are found to be in good agreement.

**Keywords:** FT-IR, FT-Raman, MBTPE

## Introduction

Thiophenes are part of many organic compounds [1] having wide application in the field of electronics, optoelectronics, materials and medicine [2]. Thiophene and its derivatives exhibit diverse biological properties such as insecticidal, antibacterial, antifungal, antioxidant and antiviral activity. The significant pharmacological efficiency of the compounds containing a thiophene ring in their structure are known for their antihistaminic, antidepressant, anesthetic, anticonvulsant, antispasmodic, antitussive and analgesic action [3].

Nowadays, the scientists utilize computational methods which are comfortable to characterize the molecule because of their effectiveness and accuracy with respect to the calculation of a number of molecular properties [4].

Quantum chemical computational methods have showed to be a powerful tool for interpreting the vibrational spectra. DFT calculations are identified to give excellent vibrational wavenumbers of organic compounds, if the calculated wavenumbers are scaled to compensate for the treatment of electron correlation, for basis set deficiencies and for anharmonic effects [5-7]. The current study reports a complete vibrational analysis of studied molecule MBTPE by combining the experimental IR and Raman spectral data and theoretical information using scaled quantum chemical technique based on density functional theory (DFT).

## Experimental details

A mixture of 2-(benzoylamino)-3-(thiophen-2-yl) prop-2-enoic acid (2.73g, 0.01 mol) and 30ml of methanol in presence of catalytic amount of glacial acetic acid were heated under reflux for 6-8h. The reaction mixture was cooled and poured on to cold water, the solid mass obtained was filtered off, washed with cold water and single crystals were grown from methanol:dimethyl formamide (1:1) mixture by the slow evaporation method (M.P. 435-436K)

The FT-IR spectrum of studied compound was recorded in the range of 400-4000 cm<sup>-1</sup> on Perkin-Elmer Paragon 1000 spectrometer. FT-Raman spectrum of the sample was recorded using 1064 nm line of the Nd:YAG laser as excitation wave length in the region 50-3500 cm<sup>-1</sup> on a Bruker RFS 100/S FT-Raman. The detector is a liquid nitrogen cooled Ge detector. 500 scans were accumulated at 4 cm<sup>-1</sup> resolution using a laser power of 100 mW.

## Computational details

The quantum chemical calculations of the MBTPE were performed using DFT/B3LYP method of theory accompanied with 6-31G and 6-311G basis sets using Gaussian 09 program package 09 [8] in gas phase. The first hyperpolarizabilities and their properties ( $\beta_{\text{tot}}$ ,  $\alpha$  and  $\Delta\alpha$ ) of the title molecule were calculated using B3LYP/6-311G basis set. Density functional theory has been confirmed to be very useful in treating the electronic structure of the molecule. As the DFT hybrid B3LYP functional tends to overrate the



# The Spectroscopic Analysis, Magnetic Susceptibility, and HOMO–LUMO of 2-Phenyl-5-(thiophene-2-ylmethylidene)-3-[(E)-(thiophene-2-ylmethylidene)amino]-3,5-dihydro-4H-imidazol-4-one

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**Abstract**— The spectroscopic analysis of the 2-Phenyl-5-(thiophene-2-ylmethylidene)-3-[(E)-(thiophene-2-ylmethylidene)amino]-3,5-dihydro-4H-imidazol-4-one (PTADI) have been accounted using the experimental techniques and computations were done and derived from quantum chemical calculations. The vibrational frequencies were obtained by DFT/B3LYP method with 6-31G and 6-311G as basis sets using the Gaussian 09W program. The calculated and observed frequencies of FT-IR and FT-Raman are found to be in good agreement. The HOMO and LUMO analysis are used to determine the charge transfer within the molecule. Fukui function and the electronic properties such as electronegativity, chemical potential, ionization energy, hardness, and softness were calculated for interpreting and predicting various aspects of the reaction mechanism. The electron density of donor and acceptor, the fock matrix element of natural bond orbital (NBO) are also calculated theoretically. The Mulliken charges are calculated and analyzed along with dipole moment, polarizability and hyperpolarizability. The non-linear optical (NLO) properties of the title molecule were studied based on its calculation of polarizability and hyperpolarizability. <sup>1</sup>H and <sup>13</sup>C Nuclear Magnetic Resonance (NMR) isotropic chemical shifts are evaluated experimentally. Molecular Electrostatic Potential map (MEP) was studied for predicting the reactive sites. The Magnetic susceptibility has been analyzed for various ranges of temperatures.

**Keywords**— PTADI, FT-IR, FT-Raman, MEP, NBO, Magnetic susceptibility, NMR

## I. INTRODUCTION

Thiophene contains a five-membered ring, is one of the most important biomolecules [1-3]. Thiophene has a rich synthetic flexibility and it can be substituted at the 3<sup>rd</sup> and 4<sup>th</sup> position. Thiophene ring with the substitution at the 3<sup>rd</sup> position can be functioned in polymerization [4, 5]. The presence of Imidazole ring is importance biological building blocks. Imidazole can act as a base and as a weak acid. Many drugs consist of an imidazole ring, such as antifungal drugs [6-8]. Imidazole drugs have widened scope in remedying various dispositions in clinical medicines. Medicinal properties of imidazole include anticancer, anti-aging agents, anticoagulants, anti-inflammatory, antibacterial, antifungal, antiviral and anti-malarial [9-14]. The different use of thiophene-based compounds in applications as wide-ranging as modern drug design and integration into conductive polymers [15] has given rise to the extensive investigation. A survey of the literature reveals that to the best of our knowledge, the results carried out with Gaussian 09 package based on DFT using B3LYP at 6-31G and 6-311G basis set based on quantum chemical calculations, FT-IR and FT-Raman spectroscopy analysis of 2-Phenyl-5-(thiophene-2-ylmethylidene)-3-[(E)-(thiophene-2-ylmethylidene)amino]-3,5-dihydro-4H-imidazol-4-one (PTADI) presented in this work have not been previously reported. Herewith, we described the complete interpretation of the infra-red and Raman spectra based on the experimental and computational results, which are in excellent agreement. In this study, both theoretical and experimental studies have been completed like HOMO-LUMO, <sup>1</sup>H and <sup>13</sup>CNMR, NLO properties which give a specified description of the optimized molecular structure and vibrational frequencies of the title molecule. Magnetic susceptibility of the PTADI was calculated and analyzed by using the graphical representation of inverse on susceptibility and temperature. Based on the value of stabilization energy, which was obtained by the natural bonding orbital (NBO) theory, we implied the interaction between electron donor and acceptor.

## II. EXPERIMENTAL DETAILS

A mixture of 3-hydrazinyl-3-oxo-1-(thiophene-2-yl) prop-1-en-2-yl]benzamide (2.87 g, 0.01 mol), and thiophene-2-carbaldehyde (1.12 g, 0.01 mol) in 30 ml isopropanol were heated under reflux for 8 h. The reaction mixture was cooled and poured on cold water. The solid mass obtained was filtered off, washed with cold water, and recrystallized from methanol and dimethylformamide (1:1) mixture. Single crystals were grown from methanol: dimethylformamide (1:1) mixture by the slow evaporation method (M.P. 449 K). The FT-IR spectrum (4000-400 cm<sup>-1</sup>) of the title molecule has been recorded by a Perkin-Elmer spectrum RX1 spectrophotometer equipped with the composition of the pellet. Using the scan interval of 1 cm<sup>-1</sup> and at an optical resolution of 0.4 cm<sup>-1</sup>, the signals were collected for 100 scans. The FT-Raman spectrum has been recorded using 1064 nm line of Nd: YAG laser as excitation wavelength in the region 4000-100 cm<sup>-1</sup> BRUKER-RFS 27 Standalone FT-Raman spectrometer.





**MEDFOOD'18 [1<sup>st</sup> February 2018]**

**National Conference on Phytochemicals in Medicinal Plants and Food**  
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Research Article

**Isolation and characterization of flavonoid from ethanolic extract of leaves of *Naravelia zeylanica***

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**Abstract**

In this study the phytochemical analysis of leaves of *Naravelia zeylanica* (Ranunculaceae) plant in various ether extracts were taken up. The ether layer II was taken for study as it was screened positively for the flavonoid type of compound. The extract was chromatographed by preparative-TLC using ethanol: ethyl acetate 8.5:1.5 as the eluent. One of the flavonoid types of compound was isolated by the chromatographic method. Then, the compound was subjected to the routine chemical and spectroscopic analyses. The compound was found to be 8-hydroxy-2-(4-hydroxy-5-methoxyphenyl)-7-(tetrahydro-3,4,5-trihydroxy-6-(hydroxymethyl)-2H-pyran-2-ylloxy)-4H-chromen-4-one.

**Keywords:** Ether layer II, flavonoid, *Naravelia zeylanica*.

**INTRODUCTION**

*Naravelia zeylanica* is a small genus woody climber distributed in Himalayas<sup>1</sup>. Roots are tuberous, leaves with two opposite ovate, cordate leaflets and a terminal 3 branched tendril, flowers in pinacles, small with pleasant scent, achenes red with long feathery styles. The plants are propagated by seeds or cuttings. The stems can be twisted into strong ropes. *Naravelia zeylanica* is distributed in the tropical forests of eastern Himalayas, Assam, Bengal, Bihar, Deccan Peninsula<sup>2</sup>. They are also reported to be used as tooth sticks to cure toothaches. Roots when crushed emit a smell which is said to relieve headache. It is used as an astringent, anti-inflammatory, anthelmintic, rheumatic pain, wounds, ulcers, intestinal worm's, leprosy and skin diseases<sup>3</sup>. The ethanolic extract of *Naravelia zeylanica* yielded three important benzamides i.e., 3,4-methylene dioxybenzamide, 4-methoxybenzamide and 4-hydroxy-3-methoxy benzamide. Berberine, an alkaloid is isolated from methanolic extract of leaves of *Naravelia zeylanica*<sup>4</sup>. The present study focus to isolate a flavonoid compound (C<sub>22</sub>H<sub>22</sub>O<sub>11</sub>) based on various chemical and spectral analysis.

**MATERIALS AND METHODS**

The fresh leaves of *Naravelia zeylanica* samples were obtained locally from the Kolli Hills, Trichy. The plant species was verified with authentic specimen at Rapinat Herbarium, Trichy, Tamilnadu, India. The leaves were washed in tap water; shade dried, crushed into pieces and packed in a wide-mouthed bottle. The moisture free ethanol was poured into the bottle to soak the plant material completely. The bottle was closed air-tight and allowed to stand for 3 days. Ethanol was collected in



## Influence of change in pile diameter at various locations of a pile group in a Berthing Structure

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Numerical analyses have been performed using the Finite Element software on a single frame pile group of a Marine berthing structure in sloping ground. A case study from Chennai port trust (India) is taken with the actual soil profile of a marine environment. Diameter of piles at various locations in a sloping ground has been varied to study its influence on the load distribution among the piles and lateral load carrying capacity of the pile group. The results showed that increasing the diameter of piles in the slope crest increases the lateral load carrying capacity of the pile group, whereas increasing the pile diameter on the down slope redistributes the overall load on the frame. It is concluded that increasing the diameter of rear piles decreases the deflection of the structure to a large extent. Increasing the diameter of the front and rear piles distributes the load more evenly among the piles of the berthing structure.

[Key words: Marine structure, Berthing Structure, berthing force, mooring force, pile diameter, tie-rod anchor]

### Introduction

Piles of a Marine Berthing structure are subjected to both axial and lateral loads and are generally on sloping ground. The load sharing mechanism among these piles (which are in sloping ground) is different from the pile group present in a horizontal ground. Literature from past<sup>1-10</sup> gives a general guidance in predicting the load distribution among the piles in horizontal ground. It concludes that the front piles towards the loading direction carry more loads compared to the other piles, whereas in sloping ground, the piles on the slope crest carry the max load transferred to the structure.

Many researches are being reported on the effect of tie rods in the behaviour of marine berthing structure. The various alternative systems for a marine berthing structure considering a combination of diaphragm wall and piles in a

marine structure are studied<sup>11</sup>. The study revealed that by marginally increasing the diameter of the pile the lateral capacity of the pile was increased rather than providing tie rod anchors. Results from tie rod force measurements in a Cargo Berth at Paradeep Port (India)<sup>12</sup> and studies on the pullout capacity of anchors in marine clay for mooring systems<sup>13</sup> gives a general idea on the behaviour and load transfer mechanism of tie rod anchors.

A two dimensional (2D) finite – element analyses, to study undrained soil deformation around piles displaced laterally through soil is carried out<sup>14</sup>. The load-transfer p- $\delta$  curves produced were found to be applicable for design during passive loading but not for active lateral loading of pile groups. The p- $\delta$  curves characterize the local soil – shear deformation around the pile, whereas p-y curves used in the subgrade – reaction method of active



# The spectroscopic (FTIR, FT-Raman, and NMR) analysis, first-order hyperpolarizability, magnetic susceptibility and HOMO-LUMO analysis of 3-(4-Methylphenyl)-2-phenyl-5-(thiophene-2-ylmethylidene)-2,5-dihydro-1,2,4-triazin-6(1H)-one

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## ABSTRACT

A novel molecule, thiophene derivative 3-(4-Methylphenyl)-2-phenyl-5-(thiophen-2-ylmethylidene)-2,5-dihydro-1,2,4-triazin-6(1H)-one has conveniently synthesized and characterized through FT-IR, FT-Raman, NMR spectroscopic studies. Optimized geometrical parameters, like bond lengths and bond angles, and vibrational frequencies have performed with DFT/B3LYP method using 6-31G and 6-311G basis sets using the Gaussian 09W program package. The calculated harmonic vibrational frequencies have been compared with experimental FT-IR and FT-Raman spectra. The observed and calculated frequencies are found to be in good agreement. In addition, Mulliken atomic charges, local reactivity descriptors such as local softness ( $s_k$ ), Fukui function ( $f_k$ ), global electrophilicity and nucleophilicity of the title compound were calculated and discussed. The stability and charge delocalization of the molecule were studied by Natural Bond Orbital (NBO) analysis. The overlapping of atomic orbital along with their predicted energy was explained on the basis of HOMO-LUMO energy gap calculations. Molecular Electrostatic Potential (MEP) map has been studied for predicting the reactive sites. Magnetic susceptibility has been determined for various range of temperature. <sup>1</sup>H and <sup>13</sup>C Nuclear Magnetic Resonance (NMR) isotropic chemical shifts are evaluated experimentally.

Keywords: FT-IR, FT-Raman, NBO, Mulliken, Fukui Function, NMR, Magnetic Susceptibility

## I. INTRODUCTION

Heterocycles are extensively dispersed in nature and participate in major parts of many biochemical processes. Thus, the five-membered aromatic heterocyclic rings are included into new chemical species, by medicinal chemists [1]. Heterocyclic compounds containing thiophene have also received a considerable attention over the past years due to their wide range of biological activity [2]. Thiophene derivatives are important structural

fragment in many pharmaceutical and chemical compounds. The thiophene ring is widely found in many varieties of natural products and pharmaceuticals [3] and has functionalized in many domain of research such as electronic devices in solar cells and organic light emitting diode [4, 5]. Molecules containing triazine skeletons show considerable biological and pharmaceutical activities [6, 7].

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# Different Types of Review Approaches in Load Balancing Techniques in Cloud Computing Environment

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## Abstract

Cloud computing is the most emerging and powerful technology in the IT world. The interesting features with enhancement facilities grab the attention of the researchers into its field. Its special kind is pay-as-you-go model for the consumers, by this way the user may this service as they want like as infrastructure, platform and software according to their needs. Cloud computing is an effective management system which built a great relationship between the consumer and the cloud owner's. However there is a positive aspect s till some negatives makes the cloud computing still research field. Some of the major drawbacks still to be discussed were fault tolerance, load balancing and security. The main concept need to be discussed is load balancing; it is mainly depend on requesting the resource services. Some of the key points in load balancing is optimization in resources usage, minimum response time, boost turnout and enabling free from needless burden. Another critical issue is increased user list and cloud application types. In this exploration we focused for Load balancing, how to balance and constructed a present day strategy in a distributed computing condition. Before construct an apparatus how about we do a point by point overview look into in different existing load balancing procedures and cloud analyst tool by various authors.

**Keywords:** Security, Cloud computing and Load balancing.

## 1. Introduction

Cloud computing is a unique system in IT environment which is designed for using the IT resources remotely [1]. According to the NIST cloud computing provides pool of configurable computing resources like networks, servers, storage, applications and services by them which can be used on demand [2]. On cloud most of the applications were Drop box, one drive, Google Drive, Skype, ZOHO, Google AppEngine, and some other applications providing cloud services under the basis of pay per use. Cloud computing is mainly applicable for maintaining the Internet and centralized remote server's foe servicing data as well as application [3]. The major cloud users are software developers they can virtualizes resources and use often flexibly by payment. More over cloud computing had multiple merits which lift the industry into a conventional infrastructure. The cloud computing move and adopting its infrastructure were described in Fig 1.

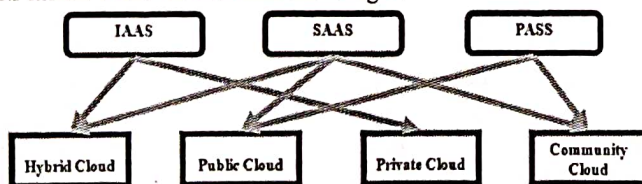


Fig. 1: Cloud Service Model

**Models of Cloud Servicing:** The cloud environment provides three major services such as Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS). The fundamental and brief illustrations of these services are given below.

**Infrastructure as a Service (IaaS):** It is the process of providing services on the basis computer peripherals devices like input, output and storage devices. In addition it provides multiple managing resources like operating systems and virtualization technologies which are currently available in the field. The main thing these resources were available in the market with high cost and which are not fit to buy for a particular projects. As after that it may be not usable for them, for this IaaS provides under rent for the customers instead of buying. It can be said as pay – for- use.

**Platform as a Service (PaaS):** It is another type of service in cloud computing which enables a perfect platform for the customers to run, develops, and manages their applications. The operations on the PaaS is not that much of complex, it enables ease in building and maintaining these infrastructure on their application.

The services on PaaS are processed in two manners such as: 1) public service of cloud from the network provider by which user can set the configuration setting and deploy the software's. In order to host the customer various applications the services provided by the PaaS were networks, servers, storage and other services. 2) The next one is software installed either in private user data centers or public user infrastructure which are controlled by the IT sectors.

**Software as a Service (SaaS):** It is the process of providing licensed software as per the customer choice under subscription basis and is centrally hosted. The only thing is consumer requires purchasing the access, and then they are eligible to use the application or services which are hosted in the cloud. The best example for SaaS is salesforce.com, as it will provides necessary details by that the consumer can interact with the cloud service provider. The well known vendor on this service is Microsoft, it expands and as





# Customized Prediction of Heart Disease with Adaptive Neuro Fuzzy Inference System

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**Abstract:** Cardiovascular Diseases are the leading cause of death globally. Cardiovascular disease is a class of diseases that involve the heart or blood vessels. It includes coronary artery diseases (CAD) such as angina and myocardial infarction (commonly known as a heart attack). There is a need for medical practitioners to predict the heart disease before they occur in the patients. Nowadays use of computer technology has in the field of medicine has highly increased. Application of Artificial Intelligence would help for the complex and uncertain medical tasks such as diagnosis of diseases [2]. The main focus of this paper is to develop a neuro fuzzy system that would analyse the various life style parameters of a person and give a feedback on the health factor related to Cardiovascular Diseases.

**Keywords:** ANFIS, Heart Attack, Prediction, Risk factor.

## I. INTRODUCTION

The heart is like any other muscle in body. It needs an adequate blood supply to provide oxygen so that the muscle can contract and pump blood to the rest of the body. It pumps blood to itself via the coronary arteries. These arteries originate from the base of the aorta (the major blood vessel that carries oxygenated blood from the heart) and then branch out along the surface of the heart. Due to various reasons, the arteries narrow make it difficult for adequate blood to reach the heart. This can cause the heart muscle to ache like any other muscle in the body. If the arteries continue to narrow, it may take less activity to stress the heart and provoke symptoms. The classic symptoms of chest pain or pressure and shortness of breath due to Athero Sclerotic Heart Disease (ASHD) or Coronary Artery Disease (CAD) are called angina.

If one of the coronary arteries become completely blocked usually due to a plaque that ruptures and causes a blood clot to form. Then blood supply to part of the heart may be lost. This causes a piece of heart muscle to die. This is called a heart attack or myocardial infarction (Death of heart muscles). There are risk factors that increase the potential to develop plaque within coronary arteries and cause them to narrow. Atherosclerosis (Hardening of heart muscles) is the term that describes this condition. Factors that put people at increased risk for heart disease are: Smoking, High blood pressure (Hypertension), High cholesterol, Diabetes, Family history of heart problems, Lack of exercise, Obesity, poor diet, and excessive alcohol consumption, among others. High blood pressure results in 13% of Cardiovascular Diseases (CVD) deaths, while tobacco results in 9%, diabetes 6%, lack of exercise 6% and obesity 5%. It is estimated that 90% of CVD is preventable [1][3]. With the advent of computer technology, intelligent systems such as Artificial Neural Networks (ANN), Fuzzy Systems and Genetic Algorithms

play a crucial role in predicting or diagnosis of diseases [2].

## II. RISK FACTORS

While the individual contribution of each risk factor in CVD varies between different communities or ethnic groups the overall contribution of these risk factors is very consistent. Some of these risk factors, such as age, Obesity, (Body Mass Index - BMI), gender, Poor diet, family history, long term ailments are immutable.

However, many important cardiovascular risk factors are modifiable by lifestyle change, social change, drug treatment (for example prevention of hypertension, hyperlipidemia, and diabetes). For better incite, the contribution of each risk factor has briefed out in this section.

### A. Age

Age is by far the most important risk factor in developing cardiovascular or heart diseases, with approximately a boosting of risk with each decade of life.[3] Coronary fatty streaks can begin to form in adolescence.[4] It is estimated that 82 percentage of people who die of coronary heart disease are 65 and older.[5] The serum total cholesterol level increases as age increases which increases the risk of heart disease. In men, this increase levels off around age 45 to 50 years. In women, the increase continues sharply until age 60 to 65 years [6].

Aging is also associated with changes in the mechanical and structural properties of the vascular wall, which leads to the loss of arterial elasticity and reduced arterial compliance and may subsequently lead to coronary artery disease [7].



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## **Effect of equivalence ratio on gasification of granular biomaterials in self circulating fluidised bed gasifier**

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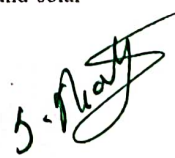
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**Abstract:** Biomass can be converted to gaseous fuels through thermo chemical conversion process. In this study rice husk, coir pith and saw dust were selected and gasified in a self circulating fluidised bed gasifier. Gas composition has been analysed for equivalence ratios of 0.3, 0.4 and 0.5 for 10-minute time intervals and its effect on gas constituents has been studied. The gas yield has been found to be in the range of 1.5–2.4 Nm<sup>3</sup>/Kg, 1.6–2.9 Nm<sup>3</sup>/Kg and 2–3.2 Nm<sup>3</sup>/Kg for rice husk, coir pith and saw dust respectively. The study has been carried out in a pilot model gasifier.

**Keywords:** self circulating FBG; equivalence ratio; gas yield; reactor temperature; gas composition; pilot model.

**Reference** to this paper should be made as follows: Ganesh, R., Jaisankar, S. and Sheeba, K.N. (2018) 'Effect of equivalence ratio on gasification of granular biomaterials in self circulating fluidised bed gasifier', *Int. J. Environment and Sustainable Development*, Vol. 17, Nos. 2/3, pp.193–201.

**Biographical notes:** R. Ganesh received his MTech in Thermal Plant Engineering from the Sastra University. He is currently pursuing his PhD in Anna University. His research interest includes biomass gasification and solar thermal energy conversion.



## EFFECTIVENESS OF INFORMATION AND COMMUNICATION TECHNOLOGY: A STUDY WITH REFERENCE TO SELECTED DEEMED UNIVERSITIES IN TAMILNADU

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### ABSTRACT

There have been several studies done on impact of Information and communication technology related to libraries. Very few of them have been conducted in Universities library. Virtually speaking none of the study were focused on deemed university libraries. The present paper provides empirical evidence to ascertain Impact of Information and communication technology in the deemed university libraries of Tamilnadu state. Data was obtained from 195 respondents who are all using deemed universities library for various purpose. Results indicate that Information and Communication technology has progressively impacted on increased or decreased in the usage of libraries among the users at deemed universities as might be expected. Finally results shows that there are 6 variables were tested with 94 questions in the questionnaire including 6 personal questions. Additionally, results indicate that out of the tested variables almost all the variable were showing positive relationship with the respondents opinion towards the deemed university libraries. The following facets namely purpose of visiting libraries, available electronic resource, bibliographic information, formal source of information and informal source of information, utilization of library service and Academic motivation of the Deemed University ICT libraries has created good impact among the users.

**Key word:** Deemed University, E-learning, ICT, Libraries, Users, and Tamilnadu

### INTRODUCTION

Information is all round us and is the staple diet of human beings. Information is variously perceived as facts, intelligence, data, news and knowledge. Information has been a common ingredient to all areas of human endeavor, be it the day-today affairs of business, matters of life and death or the most trivial of pursuits.

In a modern industrial society there are negligibly a few individuals, who do not, from time to time, occasionally or frequently have any requirement for information. It is an essential accompaniment of almost every social activity.

Information is considered as important that contributes towards the development of a nation. It provides the core for the development of knowledge, the basis for innovations, the resources for informed public, and as a result, becomes a key commodity for the progress of a society. Acknowledging the significance of information in national development, "Wasserman (1991) has noted that it is not an accident that the developed nations are those in which information products and services have been brought into being and are widely exploited, first in conventional forms and later through computer intervention". Members of a society acquire the needed information from a variety of sources. However, several of these sources are expensive, complex or difficult for individuals to acquire and use. Therefore, the role of libraries becomes vital in meeting the information needs of individuals in the society. Libraries develop their collections, facilities and services to meet the information needs of their patrons.

Over the past twenty seven years, academic libraries have been affected by changes in information and communication technology (Krubu and Osawaru 2011). The rate of changes is still accelerating in this area. The introduction of various Information Technology (IT) trends has led to reorganization, change in work patterns, and demand for new skills, job retraining and reclassification positions. Technological advancement of the past twenty five years, such as the electronic database, online services, CD-ROMs and introduction of internet has radically transformed access to information. Rana (2009) describes that ICT holds the key to the success of modernizing information services. Applications of ICT are numerous but mainly it is used in converting the existing paper-print records in the entire process of storage, retrieval and dissemination.

ICT has impacted on every sphere of academic library activity especially in the form of the library collection development strategies, library building and consortia. ICT presents an opportunity to provide value-added information services and access to a wide variety of digital based information resources to their clients. Furthermore, academic libraries are also using modern ICTs to automate their core functions, implement efficient and effective library cooperation and resource sharing networks, implement management information



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## Evaluation of Transport Properties of Concrete Made With E-Waste Plastic

CODEN: JTEVAB

### Abstract

An experimental program was carried out to study the transport properties of concrete made with E-waste plastic (high impact polystyrene (HIPS)). The concrete was prepared with different percentages (0, 10, 20, 30, 40, and 50) of HIPS as partial replacement of natural coarse aggregate by volume. The transport properties of concrete, such as water absorption and sorptivity, were investigated and results were reported. The percentage of water absorption of concrete with HIPS shows higher value compared to the control concrete. The increase in HIPS increases the water absorption of concrete but the values were within the permissible limit. The sorptivity values were increased with increase in HIPS content; all values were higher than control concrete; however, it decreased with increase in curing age. The sorptivity

were higher than control concrete; however, it decreased with increase in curing age. The sorptivity results were in line with that of water absorption results. Recycling of E-waste plastic (HIPS) as an aggregate in concrete as a new construction material may be one of the feasible solution to environment pollution, natural aggregate depletion and E-waste recycling.

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