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esearch Article

.iposome Encapsulated Astaxanthin altered Biochemical Profile in)iethylnitrosamine induced Hepato Carcinoma on Swiss Albino Mice

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ABSTRACT

Cancer is a disease in which a group of abnormal cells grows uncontrollably by disregarding the normal rules of cell division. Across several cancers, hepatocellular carcinoma (HCC) is one of the most aggressive cancers worldwide. It is held responsible for up to 1 million deaths globally per annum. HCC is inflammation-related cancer, as a chronic inflammatory state is necessary for cancer appearance. In this study, the drug astaxanthin and encapsulated astaxanthin was tested against HCC. Mice were divided into seven groups; group I: control, group II: diethylnitrosamine (DEN) induced, group III: DEN + 50 mg/kg astaxanthin, group IV: DEN + 100 mg/kg astaxanthin, group V: DEN + 50 mg/kg encapsulated astaxanthin, group VI: DEN + 100 mg/kg encapsulated astaxanthin, and group VII: DEN + 10 mg/kg sorafenib. Regular diet was given. Body weight, food intake, and water intake were noted. Other biochemical parameters, such as, alkaline phosphatase (ALP), aspartate aminotransferase (AST), albumin, proteins, and tumor necrosis factor-alpha (TNF-α), were determined. Finally, the liver was removed from each mice of different groups by sacrificing them, and histopathology was done. *In vivo* evaluation in mice models showed significant antitumor activities by both encapsulated and non-encapsulated astaxanthin at 100 mg/kg, as compared with the control, DEN induced group, and positive drug sorafenib. This research suggested that encapsulated astaxanthin can also be used as chemotherapeutic agent for the treatment of HCC.

INTRODUCTION

Various studies have been proved the links between humans and diet.[1,2] Numerous substances naturally present in foodstuffs, particularly anti-oxidant compounds, have shown a promising effect as potential chemopreventive agents.[3-5] Among these phytonutrients, the yellow, orange, and red carotenoid pigments have recently sparked much interest. Several naturally occurring carotenoids other than β-carotene have exhibited anti-cancer activity,[6-9] and are being considered further as potential chemopreventive agents. Among these carotenoids, the red pigment astaxanthin is of particular interest in health management due to its unique structural and chemical properties.[10,11] Among various carotenoids, the red pigment astaxanthin shows particular interest in the health field, is widely distributed in shrimp, salmon, crab, and asteroidean.[6] Astaxanthin was approved by the United States Food and Drug Administration (USFDA) in 1987 as a feed additive for use in the aquaculture production. And in 1999, it was approved for use in nutraceutical industry as a dietary supplement.[8] When compared to other carotenoids, such as, canthaxanthin, lutein, zeaxanthin, and β-carotene, more powerful anti-oxidative property was produced by astaxanthin.[9] The two oxygenated groups on each ring structure were responsible for its anti-oxidant features (Fig. 1).[10] It has

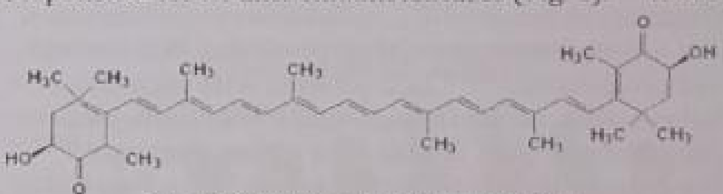

Fig. 1: Chemical structure of astaxanthin

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A REVIEW ON CHAOTIC COVID-19 INFECTION: PATHOPHYSIOLOGY AND TREATMENT INSIGHT

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ABSTRACT

The whole world is now under enormous stress of COVID-19 a pandemic, caused by novel SARS-CoV-2 a highly contagious disease. The World Health Organization coordinates to manage those impacts caused by COVID-19 and declared it as a global public health emergency. This article reviews on the chaotic global pandemic outbreak of Coronavirus infection (SARS-CoV-2)/(COVID-19). Itnal so highlights on the source of infection, mechanism of infection, route of transmission, clinical manifestation, pathophysiology preventive measures, and treatment available in both allopathic and indigenous medicine, to render awareness on this new infectious disease.

Keywords: COVID-19, diagnosis, risk factor, prevention, antiviral medication, immunotherapy

INTRODUCTION

The COVID-19 had originated from China. In December 2019 the first case was reported in Wuhan, China. Later on, it started to spread in various regions throughout China. The name of the virus as SARS-CoV-2 coined by International Committee on Taxonomy of Viruses.The World Health Organization (WHO) officially named the disease as COVID-19 on 11.2.2020 and declared its spread as outbreak for Public Health Emergency of International Concern (PHEIC) which later declared as global pandemic on March 11th 2020[1].Around the world, more than 213 countries and territories have reported for COVID-19 pandemic. The infection is spreading day by day, and the healthcare system struggles every day to take care of infected individual especially in extremely infected countries such as USA, Brazil, India, Peru, Russian Federation, Chile, UK, Mexico, Spain, Italy, Iran, etc.,[2].COVID-19 pandemic started in India on 30thJanuary 2020, in Kerala which has imported from China. To date, India includes among the topmost severely hit country with the total number of confirmed cases 2,088611 updated on 8th August 2020[3].

Coronavirus structure

Coronaviruses are single strand RNA and the diameter is 80–120 nm. The four family of coronavirus are α-coronavirus, β-coronavirus, δ-coronavirus and γ- coronavirus[4].Six types of coronaviruses were known to cause disease in humans, including severe acute respiratory syndrome (SARS-CoV) and Middle East respiratory syndrome coronaviruses and (MERS-CoV)[5] before SARS-CoV-2. COVID-19belongs to the β-coronavirus family, a large class of viruses prevalent in nature. Similar to other viruses, this virus has many natural hosts, intermediate hosts and final hosts which pose significant challenges for the prevention and treatment of viral infection. Compared with SARS-CoV and MERS-CoV, SARS-CoV-2/COVID-19 has high transmissibility and infectivity, and a low mortality rate[6].COVID-19 poses a significant threat to global public health.

Mechanism of infection

SARS-CoV-2 uses angiotensin-converting enzyme 2 (ACE2) as its receptor, in common with SARS- CoV[7]. Coronaviruses recognize their analogous receptors on target cells through S

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ANTI-OXIDANT EVALUATION AND MOLECULAR DOCKING STUDIES OF PHYTOCOMPOUNDFROM *MADHUCALONGIFOLIA*AS POTENTIAL THYMIDYLATE SYNTHASE INHIBITOR

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Running Title: Anti-oxidant Evaluation and Molecular docking studies of *Madhucalongifolia*

ABSTRACT

Best alternative for cancer treatment is medicinal plants with numerous pharmacological properties which is used in many countries around the world. The present study was focussedto implement docking analysis of some phytocompounds present in *Madhucalongifolia* for anticancer action on thymidylate synthase to analyse potency of phytocompound. *Madhucalongifolia* leaves were dried and powdered. The powder was extracted with ethanol and water. In order to know the antioxidant potential of plant extract, phytochemical analysis followed by DPPH scavanging assay was done. The highest antioxidant activity was observed in ethanolic extract and therefore, this extract was chosen for further stuides. The phytocompounds were functionally analysed by FTIR and GC-MS analysis. The GC-MS analysis determines the existance of various compounds in *Madhucalongifolia*ethanolicextracts. 5,5',8,8'-Tetrahydroxy-3,3'-dimethyl-2,2'-binaphthalene-1,1',4,4'-tetrone ($C_{22}H_{14}O_8$) was one of the compound used for docking studies. Binding energy valueshowedthe synthesized compound selectivity towards ATP-binding pocket of Thymidylate synthase, the enzyme target in cancer chemotherapy. The computational methodology such as molecular docking analysis is efficient in finding effective drugs made of natural origin against these diseases. Its evident that *Madhucalongifolia* contains various phytocomponents and considered as a plant of medicinal value against cancer.

Key words: Antioxidant activity; FTIR; GC-MS analysis; *Madhucalongifolia*; Phytochemical screening; Total phenolic content.

INTRODUCTION

Oxidative stress results out of increased free radicals are responsible for the development of various life threatening diseases including cancer. Haemorrhagic shock, arthritis, atherogenesis, Alzheimer disease, Parkinson's disease and some gastrointestinal disorders are the diseases resulting from free radicals[1]. Deleterious effects of free radicals such as oxidative damage of living cells are prevented by antioxidants, both exogenous or endogenous. This free radical scavengers can be synthetic and natural. Butylatedhydroxyanisole (BHA), Butylatedhydroxytoluene (BHT), *tert*-butylhydroquinone (TBHQ) and propyl gallate (PG) are the synthetic antioxidants induces toxicity during long time usage[2]. Now, many in-depth studies are carried out in searching natural antioxidants from herbal sources.

Cancer is an abnormal growth of cells with potential speed in spreading to otherbodyparts. Cancer can affect different types of organ such as digestive, nervous, and circulatory systems, where hormones are released abnormally even to untargeted organ results in affecting the normal body function[3].Eventough there are many medicinal treatment available to treat cancer, they are not

Review Article

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COVID-19 associated thromboembolism: causing the respiratory failure

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Abstract

Coronavirus disease 2019 (COVID-19) has recently emerged in China and caused a global pandemic. WHO announced that COVID-19 could be characterised as a pandemic due to unprecedented swift global spread and severity of the outbreak. When infected with the virus, patients usually have a fever, dry cough, dyspnoea, myalgia, headache and sometimes diarrhoea. Updates on molecular characteristics of SARS-CoV-2, treatment and epidemiological control are more important to help optimise the disease control measures. Thrombotic complication is an essential issue in patients infected with COVID-19. Concomitant venous thromboembolism (VTE) seems to be a potential cause of unexplained deaths in COVID-19 cases. Thrombocytopenia, elevated D-dimer, prolonged prothrombin time, and disseminated intravascular coagulation are the clinical findings related to such condition. In China, anticoagulant therapy in severe COVID-19 was suggested for improving outcome. Studies showed the urgency for VTE diagnostic strategies. Aetiology may be multifactorial, and therefore, we review the available literature relevant to acute venous thromboembolism associated with novel coronavirus infection.

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INTRODUCTION

Since December 2019, the third zoonotic coronavirus breakout causes human to human transmission resulting in novel severe acute respiratory syndrome coronavirus 2. Started from Wuhan, China, this pathogen has become the centre of global attention, due to the rapid spread worldwide (Gorbalenya *et al.*, 2020). Cardiovascular disease, hypertension and diabetes mellitus are the most common underlying diseases in adult patients, with males more severely affected than females (Lai *et al.*, 2020; Giannis *et al.*, 2020). This novel virus is related to the SARS virus and has the potential to develop the severe respiratory syndrome. Initially, the Spike protein(S-protein) of SARS-CoV-2 binds with angiotensin-converting enzyme 2 (ACE2). Furin-like cleavage site in the S- protein causes enhancing viral fusion with host cell membranes. This COVID-19 has a pro-inflammatory and hypercoagulable state with a marked increase in Lactate Dehydrogenase, Ferritin, C-reactive protein, D-Dimer, and Interleukin levels (Han *et al.*, 2020). A thrombotic complication is an essential concern in COVID-19 patients with elevated D-dimer. Acute infections are even associated with a transiently increased risk of venous thromboembolic condition (Danzi *et al.*, 2020). Association between influenza asso-

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Antibacterial, Antioxidant and Anticoagulant Efficacy of *C. verum* Mediated Silver Nanoparticles

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ABSTRACT

The objective of this work is to synthesis silver nanoparticles using Cinnamon bark extract as the reducing agent and its antibacterial, anticoagulation and antioxidant activity was studied. The green silver nanoparticles were monodisperse, spherical and 70 nm in diameter. A positive antibacterial activity against Pseudomonas, *Pseudomonas aeruginosa* was found in both methanol extract and silver nanoparticles. The maximum relative inhibitory zone is 94% as observed in AgNp. The FRAP antioxidant activity of cinnamon was 400 µM at 100 µg/ml and 700 µM by green AgNp. *in vitro* anticoagulant activity of AgNp was confirmed at 10 µg/ml. The AgNPs exhibited profound anti-coagulant activity as compared to heparin. Even though several anticoagulants have been reported from biological sources, only a few nanoparticles have been reported as anti- coagulant and thrombolytic activities. Further characterization of the capping agent and stability of AgNp are needed to find out the efficiency of AgNp as anticoagulant.

Keywords: Antioxidant, Cinnamaldehyde, Coagulant, Nanomedicine, Platelet

INTRODUCTION

Cinnamon is a spice that is popularly used as flavorings, as a condiment and in cooking. There are two kinds of Cinnamon, one is the "true Cinnamon" which is native in Sri Lanka (*Cinnamomum verum*) and the other one is "Cassia" (*Cinnamomum Cassia*) which is being commercially cultivated in other Southeast Asian countries. The volatile oils obtained from the bark, leaf, and root barks vary significantly in chemical composition, which suggests that they might vary in their pharmacological effects as well (Shen *et al.*, 2002). The plant is also economically important because the other species of this genus are expensive (Ben-Erick, 2005).

Cinnamon (*Cinnamonum zeylanicum*) contains a number of antioxidative components including vanillic, caffeic, gallic, protochatechuic, p hydroxybenzoic, p coumaricd, and ferulic acids and p hydroxybenzaldehyde (Munnaluri *et al.*, 2005). Cinnamon could be described as a natural powerhouse that is filled with antioxidants, anti-inflammatory, and blood sugar-lowering abilities. For instance, cinnamon taken from the inner bark of tropical trees is also a powerful antioxidant (Kannappan *et al.*, 2006). The word "nano" is used to indicate one billionth of a meter or 10^{-9}. Nanoparticles are clusters of atoms and their size from 1–100 nm. "Nano" is a Greek word meaning extremely small. Nanotechnology is a field that is vast in making an impact in all fields of human life

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RESEARCH ARTICLE

Antibacterial action of *Pedilanthus tithymaloides* leaves extract and FTIR Phytochemical Finger printing

Gomathi S[1], Jannathul Firdous[2*], Shanmugapriya A[1], Varalakshmi B[1], Karpagam T[1], Bharathi V[1], Anitha P[1], Mahalakshmi P[1]

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ABSTRACT:
Medicinal plants are used to produce new antimicrobial drugs due to increased bacterial resistance of antibiotics. The plant *Pedilanthus tithymaloides* said to possesses the wide range of medicinal properties which were confirmed through previous studies. The present study was to determine its antimicrobial activity using its leaves extract and also analysing whether their phytochemical constituents are responsible for its anti-microbial activities. *Pedilanthus tithymaloides* leaves extract was obtained and tested for antimicrobial activities and analysed for the presence of chemical constituents by preliminary phytochemical analysis and by FTIR analysis. The antimicrobial susceptibility studies were conducted against gram (-) bacteria such as *Escherichia coli*, *Pseudomonas aeruginosa* and gram (+) bacteria such as *Staphylococcus aureus*. The current result supports the medicinal use of the leaf which acts as an antimicrobial agent. However further studies are needed to isolate the active compound from the leaf and to study the antimicrobial activity of that active compound.

KEYWORDS: Anti-bacterial activity, FTIR, Infectious diseases, Phytochemicals, *Pedilanthus tithymaloides*.

INTRODUCTION:

Nature gifted plants and herbs are used in traditional medicine to cure many serious diseases even from the ancient period. Around the world, those herbs and plants are still used to get relief from dangerous illness as the herbs are safe and natural source of drug[1]. Based on the phytochemical constituents, vast number of herbs are proved to be effective. These plant natural products are now exclusively used in drug developmental process of pharmaceuticals. The use of herbal medicines is steadily growing with approximately 40 per cent of population reporting use of herb to treat medical illnesses within the past year. Public, academic and government interest in traditional medicines is growing exponentially due to the increased incidence of the adverse drug reactions and economic burden of the modern system of medicine[2].

Plants in its natural form of medicine help people to stay healthy in the face of chronic stress and pollution, and to treat illness with medicines that work in count with the body's own defence. The different parts of plants contain components with various pharmacological properties and some are nutritive in function[3].

Infectious diseases are one of the major high proportions of health problems all around the world. Symptoms associated with bacterial infections includes fever, chills, headache, nausea, vomiting and even organ failures that affects the patient's life severely. Pathogenic bacteria invading the body through various routes emit toxins which damage cells and tissues that consequently results in the such symptoms of bacterial disease[4]. Microbial resistance against antibiotics has created immense clinical problem in the treatment of infectious diseases. As a result, the use of antibiotics in treating the diseases may also produce adverse toxicity in humans. One way to prevent antibiotic resistance is to utilize new compounds that are not based on existing synthetic antimicrobial agents[5]. In addition to problem of resistance, environmental degradation and pollution associated with irrational use of orthodox medicines are

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REENING OF FUNGI FOR PRODUCTION AND PURIFICATION OF OMEGA-3 FATTYACID

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RACT

ı fatty acids, major importance in the prevention or treatment of a range of human diseases or disorders related with inflammation. These fatty ıre found in transgenic plants, fungi, and animals and even in microorganisms but in major amounts can be extracted from fatty fish. However, bioaccumulation of fat-soluble vitamins and high levels of saturated and omega-6 fatty acids, they may have deleterious health effects. It becomes ary to search for novel and rich sources containing omega-3 fatty acids and one of the alternatives include fungi. The present study deals with tion and purification of omega-3 fatty acids from Trichoderma viride and Aspergillus niger. In the present study, the main objective was to explore neficial effects of fungi for the maximum lipid production through optimized conditions and the results clearly showed that Trichoderma viride e significantly highest lipid producer, with lipid production at initial pH 6.0 and incubation temperature 40°C.

ords: Fungi, fatty acids, pH, PUFA, temperature

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ODUCTION

Omega-3 (ω-3) fatty acids essential for cardiovascular health ually polyunsaturated fatty acids (PUFAs) and are recognized as tial dietary components for the human health. [1] Omega-3 fatty with three essential fatty acids such as eicosapentaenoic acid), docosahexaenoic acid (DHA) and alpha-linolenic acid (ALA) significant health benefits in preventing arteriosclerosis and ary heart disease, and for reducing arthritis by preventing certain nmation.[2] They are considered as essential nutrients since human cannot synthesize them, they have to be provided through food. tough, these essential fatty acids can be synthesized in the body alpha linolenic acid (ALA) but only in meagre amount. Such which also an 18-carbon omega-3 fatty acid are found in plants as flaxseed, soybeans and walnuts.[3] Omega fatty acids are rich lmon, halibut, tuna and other sea foods include algae and krill. [4] suming omega-3 PUFA may be the one among therapeutic egies to prevent the "cytokine storm" in cardiovascular plications associated to COVID-19. [5] Generally, omega fatty acids are structure with repeated double bonds. Such double bond occurs first between the third and fourth carbon counting from the methyl end (omega carbon) of the chain. [6]

Omega fatty acids can change the rigidity property of the cell membrane by modulating the membrane channel proteins with altered cellular function.[3] They can bind to transcription factors such as PPAR-α, HNF-4α and SREBP-1c in order to regulate gene expression that has direct impact on inflammatory pathways. Even they regulates proliferator-activated receptor of peroxisome and helps in the healing of intestinal mucosa. [7] By incorporating in membrane phospholipids, omega fatty acids are increasing systemic arterial compliance. [8] In endothelial cells, omega fatty acids are involved in the release of nitric oxide for improved endothelial function. Omega fatty acids can decrease serum levels of triglycerides through fatty acid degradation. [9] Furthermore, they are anti-thrombotic, when taken in high doses.[10] DHA is the fatty acids found rich in retinal phospholipids and they involved in maintaining the functional integrity of retina. [11]

TUDY ON CONSUMER PREFERENCE TOWARDS MOBILE PHONES IN TIRUCHIRAPPALLI TOWN

ABSTRACT

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ABSTRACT

This paper explores the factors influencing consumer preference ·ds mobile phones and investigates the reasons that trigger the purchase of new The brand loyalty of consumers is explored and the influence of gender on e of purchase is examined. The preferences of consumers can, to a larger extent, :t the technology push driven mobile phone industry in creating new models g innovative features to satisfy them. Modern day smart phones have made one : largest impacts on human lives. The mobile phones dominate most of modern ın in every movement of life, which nowadays is becoming a part of basic needs ɔerson as means of communication across the globe during the latest fifteen years.

vords: Consumer perception, Satisfaction and Brand Loyalty.

RODUCTION

Mobile phone have become an inevitable part of personal nunication today. Majority of the people, irrespective of their age, income and raphic location, have accepted it as a necessary aspect of their day to day lives. ile phone industry all over the globe is currently passing through a turbulent ıess environment due to hightening competition as well as the continuous ges in the tastes, preferences and requirements of the customers. Due to this, the ers in the industry constantly engage in innovation and differentiation to meet satisfy consumer preferences. However the consumer behavior literature has very

Optimal feature selection for speech emotion recognition using enhanced cat swarm optimization algorithm

M. Gomathy

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imal feature selection for speech emotion recognition using anced cat swarm optimization algorithm

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ract

an interactions involve emotional cues that can be used to interpret the emotion expressed by the speaker. As the vocal ions vary from one speaker to another, there is a chance of misinterpretation. To determine the emotion expressed by the ker, a speech emotion recognizer can be utilized. It is known that speech expresses the emotional states of humans along the syntax and semantic content of linguistic sentences. Therefore, human emotion recognition using speech signaling ssible. Speech emotion recognition is a crucial and challenging task in which the feature extraction plays a prominent in its performance. Determining emotional states in speech signals is a very challenging area for many reasons. The ssue of all speech emotion systems is the selection of the best features, which is powerful enough to distinguish various ions. The presence of different language, pronunciation, sentences, style, and speakers adds additional difficulty since characteristics include pitch and energy that directly alters most of the features extracted. Redundant features and high utational cost make emotion recognition an undesirable task. Instead of focusing on the words, the vocal changes and nunicative pressure on the words should be taken as the primary consideration. The Enhanced Cat Swarm Optimization SO) algorithm for feature extraction has been proposed to address these issues and it is not used in any existing speech tion recognition approaches. The proposed approach achieves excellent performance in terms of accuracy, recognition sensitivity, and specificity.

vords Speech emotion recognition · Cat swarm optimization · Opposition based learning · Support vector neural ork · Feature extraction

ntroduction

speech signal consists of linguistic information and also linguistic one such as emotion. The modern automatic ch recognition systems have achieved high performance utral style speech recognition (Gharavian et al. 2012). acoustic and prosodic features of speech are affected motions and speaking styles as well as speaker charristics and linguistic features. Although the emotional does not alter the linguistic content, it is an important or in human communication and improving the voiceed man–machine interactions (El Ayadi et al. 2011). -machine interaction is one of the key goals in develg automatic emotion recognition (AER) systems. The AER system is a key component in many applications such as spoken tutoring systems, medical-emergency domain to detect stress and pain, interactions with robots, computer games, call centers, and developing man–machine interfaces for helping people (Milton and Tamil 2015). In the field of multimedia contents management, it is used for emotional labeling and retrieval of the contents (Xiao et al. 2010). In the computer game, identification of the emotional state of a player is used to assess the interest of the player.

In the field of the computer-based tutorial system, the learning rate of students can be improved by making the system take into account the emotional states of students. Generally, the emotion recognition system has three components: feature extraction unit, feature selection unit, and emotion recognition unit (Sheikhan et al. 2013). However, the performance of emotion recognition is still far from the expectation of researchers. In speech emotion recognition, there are mainly two difficulties that are how to find effective speech emotion features, and how to construct a suitable

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COUNTERMEASURES TO ENHANCE THE DECEPTION CAPABILITY OF HONEYPOT THROUGH NETWORK SERVICE FINGERPRINTING TECHNIQUES

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CT

ıeypot is meant to trap attackers far away from the pc resources the attackers try to compromise. Al tracks attacker's activities and helps researchers learn about their attack patterns. However, honeypot a ıntified by attackers using various fingerprinting methods. In this research, threat modeling is used to ident threats that reveal its existence which made honeypot ineffective. Various countermeasures are used in t and the proposed countermeasures have proved effective to enhance the deception capabilities of ı have tested.

UCTION

ecurity threats continue to rise at an alarming rate as more and more systems and application vulnerabilit o increase [1]. These threats are contributed by common Internet services such as Email & Web services a e of mobile devices and Internet of Things usage as well, as demonstrated by the recent Distributed Denial DDoS) attack [2]. Attackers persist to find new ways to probe, attack, and compromise systems and ons they are targeting. Firewalls and Intrusion Detection Systems (IDS) have always been used intensively gainst known Internet security threats and attacks to the systems connected to the Internet. However, t rotection does not protect against unknown threats , that over time may cause even larger damage to t system owner.

Honeypot provides an exceptional way to detect these unknown threats, which may include possil by attackers [3]. It can gather information useful attack patterns, which may help the system administrator ıardening systems to provide better security defense. With the increased usage of honeypots [4, 5], attack are their ways to defeat them. The attacker often uses fingerprinting techniques to probe the system's profi system version, open services, and vulnerabilities. Using the same techniques, the honeypot system co dentified and thus make the system useless. In the worst case, the attacker can create a false intrusion to causing disturbance to the system.

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CERTIFICATE AUTHENTICATION USING BLOCKCHAIN TECHNOLOGY

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ct: As education becomes more diversified, decentralized and democratized, we still need to maintain reputation, trust in ation and proof of learning. Nowadays everyone has to show his/her Document and Certificate to any other person for urpose/job. After seeing the document 3rd person cannot validate the originality of the certificate. The same thing is for a land registry, PAN card, and Aadhar card verification. The increased focus on relevance and employability may sh us in this direction, as we also need more transparency. We can solve this problem or get trust by using blockchain ogy. The digital currency Bitcoin is probably the best-known application of blockchain and is even better known than the iain technology. The blockchain is a chain of blocks and blocks are immutable in a distributed environment, it which devices are not all connected to a common processor. It is a database of records/public ledger of all transactions /digital that have been performed and information is shared within participating parties. Each entry in the system is verified by a consent of the participants in the system. Once information is entered in blockchain it cannot be erased. It could a system that is transparent and secure. Blocks (Ordered Records) are added to blockchain with timestamp and a link to ous block. Verifying a diploma/certificate today takes a good amount of time and requires human resources or human ces to request confirmation of details from universities. A possible solution is Blockchain. Blockchain for education may w concept. By using this technology, No need for a central authority to validate certificates. Your college won't have to a copy of your transcript and prove to anyone you have your degree We are building a platform that will be open, ble and one piece of software at a time and students can get Blockchain-based educational certifications. Blockchain-educational certifications are the digital certificate and registered on the Ethereum Blockchain that will be graphically signed and tamper proof). Another person can view the certificate online, and no 3rd party validation is d for these digital certificates.

I. INTRODUCTION

ates distributed in colleges or universities are mostly in the form of hard copy. Whenever applicants apply for the job at any or private sector they have to produce those hard copies, while the organizations have to verify all certificates manually which is me-consuming process and there are chances that some may have produce the certificate which is not legit and that may get ed by the verifier during the process because of this ineligible candidate will get a chance. There had been lots of cases in past people are caught selling fake certificates of different organization at low cost. To eradicate such problem and diminish the tion of fake certificates we can use the Blockchain technology. Blockchain can be used to store the data of the certificate that can dated by anyone from any place. The blockchain is a decentralized shared distributed ledger; the data stored in the blockchain is un-modifiable. It is a type of database which is not centralized and governed by the set of rules.

tives

study, we are going to develop the decentralized certificate verification application on the Ethereum Blockchain. We are selecting chnology because it is traceable, tamper proof and encrypted. By integrating the blockchain technology we will be able to ate the problem of fake certificates. We will use smart contract at backend to interact with the blockchain and the encrypted hash of each document will be stored in blockchain which will be verified against the user document.

II. LITERATURE REVIEW

mart grid systems, secure in-network data aggregation approaches have been introduced to efficiently collect aggregation data, preserving data privacy of individual meters. Nevertheless, it is also important to maintain the integrity of aggregate data in the ce of accidental errors and internal/external attacks. To ensure the correctness of the aggregation against unintentional errors, we se an end-to-end signature scheme, which generates a homomorphic signature for the aggregation result. The homomorphic re scheme is compatible with the in-network aggregation schemes that are also based on homomorphic encryption, and supports t batch verifications of the aggregation results. Next, to defend against suspicious/compromised meters and external attacks, we a hop-by-hop signature scheme and an incremental verification protocol. In this approach, signatures are managed distributedly rification is only triggered in an ex post facto basis - when anomalies in the aggregation results are detected at the collector.
computing has been envisioned as the de-facto solution to the rising storage costs of IT Enterprises. With the high costs of data e devices as well as the rapid rate at which data is being generated it proves costly for enterprises or individual users to frequently their hardware. Apart from reduction in storage costs data outsourcing to the cloud also helps in reducing the maintenance. Cloud e moves the user's data to large data centers, which are remotely located, on which user does not have any control. However, this feature of the cloud poses many new security challenges which need to be clearly understood and resolved. One of the important

ECURE AND ENERGY-EFFICIENT DISJOINT MULTIPATH ROUTING PROTOCOL

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ıct—Recent advances in micro electromechanical system (MEMS) technology have boosted the ment of wireless sensor networks (WSNs). Limited by the energy storage capability of sensor nodes, it is to jointly consider security and energy efficiency in data collection of WSNs. The disjoint multipath ; scheme with secret sharing is widely recognized as one of the effective routing strategies to ensure the of information. This kind of scheme transforms each packet into several shares to enhance the security of ission. However, in many-to-one WSNs, shares have high probability to traverse through the same link and ntercepted by adversaries. In this paper, we formulate the secret-sharing-based multipath routing problem ›ptimization problem. Our objective aims at maximizing both network security and lifetime, subject to the constraints. To this end, a three-phase disjoint routing scheme called the Security and Energy-efficient ıt Route (SEDR) is proposed. Based on the secret-sharing algorithm, the SEDR scheme depressively and ıly delivers shares all over the network in the first two phases and then transmits these shares to the sink 3oth theoretical and simulation results demonstrate that our proposed scheme has significant improvement ⁄ork security under both scenarios of single and multiple black holes without reducing the network lifetime.

Terms—Black hole, multipath routing, network lifetime, security, wireless sensor networks (WSNs).

›DUCTION

WIRELESS sensor networks (WSNs) have been widely deployed for an extensive range of applications, ; intelligent transportation, military, and civilian domains [1]–[3]. The characteristics of wireless sensor such as low cost, simplicity, and broadcast, have further accelerated the deployments of WSNs. To this lvanced wireless techniques, such as vehicular sensor networks (VSNs), are emerging to collect sensing d provide them to users. However, these characteristics may also cause some potential safety risks [4]–[6]. ıole attack is one of attacks that adversaries may choose to interfere with information delivery. In some adversaries may have mobility to increase the number of black holes for achieving a high packet ption probability. Generally, compromised node (CN) and denial of service (DOS) attacks are two kinds of ın black-hole attacks [7], [8]. In the CN attack, adversaries try to compromise a subset of nodes to ly intercept the packets traversing these nodes. In the DOS attack, adversaries actively disrupt, change, or ıralyze the functionalities of subset nodes, such that the normal operations of WSNs cannot be executed.

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ENTROPY BASED TOPSIS MULTI-CRITERIA DECISION MAKING FOR INTRUSION DETECTION SYSTEM

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ABSTRACT

Intrusion detection systems (IDS) have to procedure heaps of packets with numerous features, which interrupt the finding of anomalies. Feature Selection and Sampling may be utilized to minimize processing time and hence reducing intrusion detection time. This paper is aim to evaluate the feature selection technique based on the Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS). An enhanced Entropy-based TOPSIS method is developed to suggest the one or more choices among alternatives, having many attributes. The five feature selection techniques are used to reduce the size of the network traffic dataset. The classification technique like Artificial Neural Network, Naïve Bayes and Support Vector Machine are used to calculate the computation time and intrusion detection time. The proposed TOPSIS method is used to analyze the performance of the feature selection to enhance the intrusion detection.

KEYWORDS: TOPSIS, Entropy method, Information Gain, Genetic Algorithm, Particle Swarm Optimization, Ant Colony Optimization, Artificial Neural Network, Naïve Bayes, Support Vector Machine, Intrusion Detection

I. INTRODUCTION

The computer network is increasing nowadays, and on every passing moment, billions of packets travel across any point on the Internet which is an extensive network of systems. These networks became the strength of the economy, and hence any attack on them may financially harm any company, organization or even countries. Misuse/Signature-based Intrusion Detection Systems (IDS) [1] may fail to detect the zero-day attack, and hence networks are slowly moving towards anomaly-based IDS. These systems necessitate training by utilizing traffic traces besides with their features. In these systems specific training is crucial as it learns normal behavior of network so, traffic traces with good characteristics are very significant. After the training, IDS [2] operates millions of packets with several numbers of features to identify the intrusions. A large number of feature expects additional time to method this movement. But identification of intrusion should be a time limit to avoid any loss to the network. The sampling method is used to minimize the dimension of training dataset utilized for IDS. Timely detection of intrusion can decrease losses because of attacks on the systems. To train IDS, training dataset containing network packets, are served into this network. A large number of features of this dataset maximize the total detection time because of more computations. Feature selection may be applied to reduce the feature set by preserving accuracy within acceptable bounds. Several algorithms are existing for feature selection. Algorithms may behave contrarily for different types of dataset. So analysis is required to find out the suitable algorithm for IDS. In this article various features selection algorithms are compared on different parameters like accuracy, some features, root mean square error (RMSE), Receiver Operating Characteristic (ROC), Recall, precision. In certain conditions, it may become challenging

TRANSFORMING TECHNICAL EDUCATION TOWARDS INDUSTRY NEEDS

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ABSTRACT

Technical education plays a pivotal role in the socioeconomic circumstances of a nation. There is a huge talent crunch prevails in the global arena. In order to acquire and impart skills to bridge the void, a sound professional training caters to skilled human resources. In India, only 12% of the engineering graduates come out with flying colors while compared to the mammoth graduates from over 4500 engineering colleges. It indicates lack of employability skills rather than lack of opportunity. The contemporary Indian educational system tests the memorizing skills of the students than practical knowledge or knowledge of application. Hence there is a discrepancy which flanks the education system as it doesn't cater to the needs of industries. The measures such as Memorandum Of Understanding (MoU) signed with industries, industrial training for faculties and students, effective regulation and monitoring by statutory organization like the All India Council for Technical Education (AICTE) and the University Grants Commission (UGC) might help to improve the quality of the graduates by making them employable for the economic augmentation of our nation.

Keywords: MoU, UGC, AICTE, NAAC, NBA, NASSCOM

1. INTRODUCTION

During the 1970s & 1980s, the graduates pursued engineering stream in India were few and faced unemployability despite having good academics, scholastic abilities and the unemployment rate of 80% [14] was at its crest [1].

In 1991, financially viable reforms altered the face of the Indian job market. Industrialization, the augmentation of public and private sector enterprises, etc. boosted employment opportunities as well as better-paying jobs. Today, software and hardware industries have boomed up to cater Technological Knowledge (TK). We are outsourcing harvest and services to international companies.

Apparently, there is no lack of opportunity and there is no plummeting of engineering graduates either. The quantity of higher education institute has left up. India rolls out the highest number of engineering graduates every

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STOCHASTIC MODELING FOR USING AN INFINITE – ALLELE MARKOV BRANCHING PROCESS OF HPA AXIS FUNCTIONING COMBINED DEX/CRH TEST

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ABSTRACT

We investigated functioning of the Hypothalamic – Pituitary – adrenal (HPA) axis in 12 young people at ultra-high risk for developing psychosis, using the combined dexamethasone corticotrophin releasing hormone (DEX/CRH) test. The focus is the frequency spectrum of the Infinite-Allele Markov branching process, namely the proportion having a given number of copies at a specified time point.

Keywords: Psychologic stress, HPA axis, Cortisol, frequency spectrum, hyper geometric function.

2010 Mathematic Subject Classification: 60G20, 60G05, 60J05

1. INTRODUCTION

The diathesis – stress model of schizophrenia contents that a combination of factors, including genetic liability, abnormal maturation, early exposures, and stress combine to affect the abnormal substrate thought to underlie schizophrenia [3,10]. In order to further elucidate the relationship between stress response and the pathophysiology of psychosis, it may be of special value to test HPA – axis reactivity during the sub-threshold stage of illness [9].

Consider an Infinite – Allele Markov branching process. Our main focus is the frequency spectrum of this process, that is, the proportion of allele

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ON THE HOMOGENEOUS CONE $z^2 = 53x^2 + y^2$

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Abstract:

The homogeneous ternary quadratic equation given by $z^2 = 53x^2 + y^2$ is analysed for its non-zero distinct integer solution through different methods. A few interesting properties between the solution are presented. Also, formulae for generating sequence of integer solutions based on the given solutions are presented.

Keywords: Ternary quadratic, Integer solutions, Homogeneous cone.

Notation:

$$t_{m,n} = n\left[1 + \frac{(n-1)(m-2)}{2}\right]$$

Introduction:

It is well known that the quadratic Diophantine equations with three unknowns (homogeneous or non-homogeneous) are rich in variety [1, 2]. In particular, the ternary quadratic Diophantine equations of the form $z^2 = Dx^2 + y^2$ are analysed for values of D=29, 41, 43, 47, 61, 67 in [3-8]. In this communication, the homogeneous ternary quadratic Diophantine equation given by $z^2 = 53x^2 + y^2$ is analysed for its non-zero distinct integer solution through different methods. A few interesting properties between the solutions are presented. Also, formulas for generating sequence of integer solutions based on the given solutions are presented.

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A SEARCH ON THE INTEGER SOLUTIONS TO TERNARY QUADRATIC DIOPHANTINE EQUATION $z^2 = 55x^2 + y^2$

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ABSTRACT

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II. METHOD OF ANALYSIS

The ternary quadratic diophantine equation to be solved for its integer solutions is

$$z^2 = 55x^2 + y^2 \qquad (1)$$

We present below different methods of solving (1)

Method: 1

(1) is written in the form of ratio as

$$\frac{z+y}{5x} = \frac{11x}{z-y} = \frac{\alpha}{\beta}, \beta \neq 0 \qquad (2)$$

Which is equivalent to the system of double equations

$$5\alpha x - \beta y - \beta zs = 0$$

$$11\beta x + \alpha y - \alpha z = 0$$

Applying the method of cross-multiplication to the above system of equations, one obtains

$$x = x(\alpha, \beta) = 2\alpha\beta,$$

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ON THE HOMOGENEOUS CONE $z^2 = 53x^2 + y^2$

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Abstract:

The homogeneous ternary quadratic equation given by $z^2 = 53x^2 + y^2$ is analysed for its non-zero distinct integer solution through different methods. A few interesting properties between the solution are presented. Also, formulae for generating sequence of integer solutions based on the given solutions are presented.

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FORMULATION OF SEQUENCES OF DIOPHANTINE 3-TUPLES THROUGH THE PAIR (3,6)

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ABSTRACT

This paper aims at formulating sequences of Diophantine 3-tuples through the pair (3,6)

KEY WORDS: *Diophantine 3-tuple,sequence of Diophantine 3-tuples*

INTRODUCTION

The problem of constructing the sets with property that product of any two of its distinct elements is one less than a square has a very long history and such sets have been studied by Diophantus. A set of m distinct positive integers $\{a_1, a_2, a_3, \ldots, a_m\}$ is said to have the property $D(n), n \in Z - \{0\}$ if $a_i a_j + n$ is a perfect square for all $1 \le i < j \le m$ or $1 \le j < i \le m$ and such a set is called a Diophantine m-tuple with property $D(n)$.

Many Mathematicians considered the construction of different formulations of diophantine triples with the property $D(n)$ for any arbitrary integer n [1] and also, for any linear polynomials in n. In this context, one may refer [2-13] for an extensive review of various problems on diophantine triples.

This paper concerns with the construction of sequences of diophantine 3-tuples (a,b,c) such that the product of any two elements of the set added by $(-2),(-9),(-14),(-17), D(k^2+8k-2), D(k^2-8k-2)$ in turn is a perfect square.

Sequence: 1

Let $a = 6,\ c_0 = 3$

It is observed that

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A Study on the Pell like Equation $5x^2-8y^2=-48$

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ABSTRACT

The hyperbola represented by the binary quadratic equation $5x^2-8y^2=-48$ is analyzed for finding its non-zero distinct integer solutions. A few interesting relations among its solutions are presented. Also, knowing an integral solution of the given hyperbola, integer solutions for other choices of hyperbolas and parabolas are presented. The formulation of second order Ramanujan Numbers with base numbers as real integers is illustrated.

Keywords: **Binary quadratic, Hyperbola, Parabola, Integral solutions, Pell equation, Second order Ramanujan Numbers.**

INTRODUCTION

The binary quadratic Diophantine equations of the form $ax^2-by^2=N,(a,b,N\neq 0)$ are rich in variety and have been analyzed by many mathematicians for their respective integer solutions for particular values of a, b and N. In this context, one may refer [1-14].

This communication concerns with the problem of obtaining non-zero distinct integer solutions to the binary quadratic equation given by $5x^2-8y^2=-48$ representing hyperbola. A few interesting relations among its solutions are presented. Knowing an integral solution of the given hyperbola, integer solutions for other choices of hyperbolas and parabolas are presented. The formulation of second order Ramanujan Numbers with base numbers as real integers is illustrated.

METHOD OF ANALYSIS

The Diophantine equation representing the binary quadratic to be solved for its non- zero distinct integer solutions is

$$5x^2-8y^2=-48 \tag{1}$$

Consider the linear transformations

$$x=X+8T\ ,\ y=X+5T \tag{2}$$

From (1) and (2), we have

$$X^2=40T^2+16 \tag{3}$$

whose smallest positive integer solution is

$$X_0=76\ ,\ T_0=12$$

To obtain the other solutions of (3), consider the pell equation

$$X^2=40T^2+1 \tag{4}$$

whose smallest positive integer solution is $(\tilde{X}_0\ ,\ \tilde{T}_0)=(19\ ,3)$

The general solution of (4) is given by

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A Classification of Rectangles in Connection with Two Fascinating Number Patterns

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Abstract:

*This paper has two sections I and II. **Section I** exhibits rectangles, where, in each rectangle, the area added with its semi-perimeter is represented either by a Gopa-Vidh number or by a Gopa-Shan number. **Section II** exhibits rectangles, where, in each rectangle, the area minus its semi-perimeter is represented either by a Gopa-Vidh number or by a Gopa- Shan number. The total number of primitive and non-primitive rectangles is also given.*

Keywords: *Rectangles, Gopa-Vidh number, Gopa- Shan number, Primitive rectangles, Non-Primitive rectangles.*

2010 Mathematics Subject Classification: 11D99

Introduction:

The diophantine problems connecting geometrical representations with special patterns of numbers are presented in [1-19]. In [20], Pythagorean triangles with $\frac{2*Area}{Perimeter}$ is represented by another number, namely Gopa – Vidh number. This paper concerns with the problem of finding rectangles such that, in each rectangle, the area added with its semi-perimeter as well as the area minus its semi-perimeter is represented either by a Gopa-Vidh number or by a Gopa- Shan number. The total number of primitive and non- primitive is also given.

It seems that the above problems have not been considered earlier.

Definitions:

Gopa-Vidh number:

Let N be a non-zero positive integer. Let 'a' represent the sum of the digits in N^2. If N^2 is a square multiple of a, then the integer N is referred as Gopa- Vidh number.

Gopa-Shan number:

Let N be a non-zero positive integer. Let 'a' represent the sum of the digits in N^3. If N^3 is a square multiple of a, then the integer N is referred as Gopa- Shan number.

Method of Analysis:

Let R be a rectangle with dimensions x and y. Let A and S represent the Area and Semi-perimeter of R.

Section-I: $A + S = \text{Gopa - Vidh number}$

The problem under consideration is mathematically equivalent to solving the binary quadratic diophantine equation represented by

$$xy + (x + y) = \alpha \tag{1.1}$$

where α is a Gopa-Vidh number.

Rewrite (1. 1) as

$$x = \frac{\alpha - y}{y + 1} \tag{1.2}$$

Given α, it is possible to find x in integers for suitable y in integers. The following Table 1.1 exhibits the Gopa-Vidh number with their corresponding rectangles satisfying (1.1):

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A SEARCH ON THE INTEGER SOLUTIONS TO TERNARY QUADRATIC DIOPHANTINE EQUATION

$$z^2 = 63x^2 + y^2$$

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Abstract:

The homogeneous ternary quadratic diophantine equation given by $z^2 = 63x^2 + y^2$ is analyzed for its non-zero distinct integer solutions through different methods. A few interesting properties between the solutions are presented. Also, formula for generating sequence of integer solutions based on the given solutions are presented.

Keywords: Ternary quadratic, Integer solutions, Homogeneous cone.

Notation:

$$t_{m,n} = n\left[1 + \frac{(n-1)(m-2)}{2}\right]$$

Introduction:

It is well known that the quadratic diophantine equations with three unknowns(homogenous (or) non-homogenous) are rich in variety [1,2]. In particular, the ternary quadratic diophantine equations of the form $z^2 = Dx^2 + y^2$ are analyzed for values of $D = 29,41,43,47,61,67$ in [3-8]. In this communication, the homogeneous ternary quadratic diophantine equation given by $z^2 = 63x^2 + y^2$ is analyzed for its non-zero distinct integer solutions through different methods. A few interesting properties between the solutions are presented. Also, formulas for generating sequence of integer solutions based on the given solutions are presented.

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A STUDY ON THE PELL –LIKE EQUATION $3x^2 - 8y^2 = -20$

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ABSTRACT:

The hyperbola represented by the binary quadratic equation $3x^2 - 8y^2 = -20$ is analyzed for finding its non-zero distinct integer solutions. A few interesting relations among its solutions are presented. Also, knowing an integral solution of the given hyperbola, integer solutions for other choices of hyperbolas and parabolas are presented. The formulation of second order Ramanujan Numbers with base numbers as real integers and Gaussian integers is illustrated and also the sequence of Diophantine 3-tuples are exhibited.

Keywords: Pell like equation, Binary quadratic, Hyperbola, Parabola,2nd order Ramanujan numbers,sequence of Diophantine 3-tuples.

INTRODUCTION:

The binary quadratic Diophantine equations of the form $ax^2 - by^2 = N, (a, b, N \neq 0)$ are rich in variety and have been analyzed by many mathematicians for their respective integer solutions for particular values of a, b and N. In this context, one may refer [1-11].

This communication concerns with the problem of obtaining non-zero distinct integer solutions to the binary quadratic equation given by $3x^2 - 8y^2 = -20$ representing hyperbola. A few interesting relations among its solutions are presented. Knowing an integral solution of the given hyperbola, integer solutions for other choices of hyperbolas and parabolas are presented. The formulation of second order Ramanujan Numbers with base numbers as real integers and Gaussian integers is illustrated and also the sequence of Diophantine 3-tiples are presented.

Method of analysis:

The hyperbola represented by the non-homogeneous quadratic equation under consideration is

$$3x^2 - 8y^2 = -20 \tag{1}$$

Introduction of the linear transformations

$$x = X + 8T, y = X + 3T \tag{2}$$

in (1)leads to

$$X^2 = 24T^2 + 4 \tag{3}$$

The smallest positive integer solution for (3) is $T_0=2, X_0=10$

To find the other solutions to (3),consider the corresponding pell equation given by

$$X^2 = 24T^2 + 1 \tag{4}$$

whose general solution $(\widetilde{T_n}, \widetilde{X_n})$ is

$$\widetilde{X_n} = \frac{1}{2} f_n$$

$$\widetilde{T_n} = \frac{1}{2\sqrt{24}} g_n$$

Where

$$f_n = (5 + 1\sqrt{24})^{n+1} + (5 - 1\sqrt{24})^{n+1}$$

$$g_n = (5 + 1\sqrt{24})^{n+1} - (5 - 1\sqrt{24})^{n+1}$$

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A STUDY ON THE POSITIVE PELL EQUATION

$y^2 = 42x^2 + 7$

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Abstract: *This paper concerns with the problem of obtaining non-zero distinct integer solutions to the positive pell equation represented by the binary quadratic equation* $y^2 = 42x^2 + 7$ *. A few interesting relations among the solutions are presented. Further, by considering suitable linear combinations among the solutions of the considered hyperbola, the other choices of hyperbolas, parabolas, pythagorian triangle,* 2^{nd} *order Ramanujan numbers, sequence of diophantine 3-tuples with suitable property are presented.*

Keywords: **Positive pell equation, binary quadratic, hyperbola, parabola, pythagorian triangle,** 2^{nd} **order Ramanujan numbers, sequence of diophantine 3-tuples.**

1. INTRODUCTION

One of the areas of Number theory that has attracted many mathematicians since antiquity is the subject of diophantine equations. A diophantine equation is a polynomial equation in two or more unknowns such that only the integer solutions are determined. No doubt that diophantine equation possess supreme beauty and it is the most powerful creation of the human spirit. A pell equation is a type of non-linear diophantine equation in the form

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A STUDY ON THE HYPERBOLA $Y^2=14x^2+1$

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ABSTRACT

The binary quadratic equation $y^2=14x^2+1$ is considered and a few interesting properties among the solutions are presented. Employing the integral solutions of the equation under consideration, a few remarkable observations are illustrated.

KEYWORDS: *Binary quadratic, hyperbola, integral solutions, pell equation.*

INTRODUCTION

Any non-homogeneous binary quadratic equation of the form $y^2-Dx^2=1$,where D is a given positive non-square integer, requiring integer solutions for x and y is called Pellian equation (also known pell-Fermat equation). In cartesian co-ordinates, the equation has the form of a hyperbola. The pellian equation has infinitely many distinct integer solutions as long as D is not a perfect square and the solutions are easily generated recursively from a single fundamental solution, namely, the solution with x, y positive integers of smallest possible size. One may refer [1-9] for a few choices of Pellian equations along with their corresponding integer solutions.

The solutions to Pellian equations have long been of interest to mathematicians. Even small values of D can lead to fundamental solutions which are quite large. For example, when D=61, the fundamental solution is (1766319049, 226153980). The above results motivated us to search for integer solutions to other choices of Pellian equation. This paper concerns with the Pellian equation $y^2=14x^2+1$, a few interesting properties among the solutions are presented. Employing the integral solutions of the equation under consideration, a few remarkable observations are illustrated.

METHOD OF ANALYSIS

The hyperbola represented by the non-homogeneous quadratic equation under consideration is

$$y^2=14x^2+1 \qquad (1)$$

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On The Transcendental Equation $\sqrt[3]{x^2+y^2}+\sqrt[2]{mx+ny}=10z^3$

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Abstract: The transcendental equation with five unknowns involving surds represented by the diophantine equation $\sqrt[3]{x^2+y^2}+\sqrt[2]{mx+ny}=10z^3$ is analysed for its patterns of non-zero distinct solutions.

Keywords: Transcendental equation, integral solutions, surd equation.

1. Introduction

Diophantine equations have an unlimited field of research by reason of their variety. Most of the Diophantine problems are algebraic equations [1,2]. In [3-17], the integral solutions of transcendental equations involving surds are analyzed for their respective integer solutions. This communication analyses a transcendental equation with five unknowns given by $\sqrt[3]{x^2+y^2}+\sqrt[2]{mx+ny}=10z^3$. Infinitely many non-zero integer quintuples (x,y,z,m,n) satisfying the above equation are obtained.

2. Method of analysis

The transcendental equation involving surds to be solved is

$$\sqrt[3]{x^2+y^2}+\sqrt[2]{mx+ny}=10z^3 \tag{1}$$

The introduction of the transformations

$$x=m(m^2+n^2) \quad , \quad y=n(m^2+n^2) \tag{2}$$

in (1) leads to

$$m^2+n^2=5z^3 \tag{3}$$

To start with, observe that

$$m=2\alpha^{3k}\, , n=\alpha^{3k}\, , z=\alpha^{2k} \tag{4}$$

Satisfy (3). In view of (2), one obtains

$$x=10\alpha^{9k} \quad , \quad y=5\alpha^{9k} \tag{5}$$

Thus, the quintuple (x,y,z,m,n) given by $(10\alpha^{9k}, 5\alpha^{9k}, \alpha^{2k}, 2\alpha^{3k}, \alpha^{3k})$ satisfies (1).

Also, taking

$$m=5^2M\, , n=5^2N\, , z=5\alpha^2 \tag{6}$$

In (3), it is written as

$$M^2+N^2=(\alpha^3)^2 \tag{7}$$

Which is satisfied by

$$M=2uv\, , N=u^2-v^2\, , \qquad u>v>0 \tag{8}$$

$$\alpha^2=u^2+v^2 \tag{9}$$

Again, note that (9) is satisfied by

$$u=p(p^2+q^2), v=q(p^2+q^2), \alpha=p^2+q^2\, , \quad p>q>0 \tag{10}$$

From (10), (8) and (6), one obtains

$$\left.\begin{aligned} m &= 50pq(p^2+q^2)^2 \\ n &= 25(p^2-q^2)(p^2+q^2)^2 \end{aligned}\right\} \tag{11}$$

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ON FORMULATING SEQUENCES OF DIOPHANTINE 3-TUPLES THROUGH MATRIX METHOD

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ABSTRACT

This paper illustrates the process of obtaining sequences of Diophantine 3-tuples with property $D(k^2+8k-2)$ through matrix method.

Key words: Diophantine 3-tuple, Sequence of Diophantine 3-tuples, Matrix application

I. INTRODUCTION

The essence of mathematical calculations is represented by numbers and they exhibit fascinating and beautiful varieties of patterns, namely, polygonal numbers, Fibonacci numbers, Lucas numbers, Ramanujan numbers, Kynea numbers, Jacobsthal numbers and so on. In this paper, a pattern of numbers known as Diophantine 3-tuple is considered. A set of three distinct integers is called Diophantine 3-tuple with property D(n) if the product of any two members of the set with the addition of n (a non-zero integer or a polynomial with integer coefficients) is a perfect square. One may refer [1-13] for an extensive review of various problems on Diophantine triples with suitable properties.

This paper illustrates the process of obtaining sequences of Diophantine 3-tuples with property $D(k^2+8k-2)$ through matrix method.

II. METHOD OF ANALYSIS

Initially, construct a diophantine 2-tuple with property $D(k^2+8k-2)$ and then, extend it to diophantine 3-tuple.

Let 1,18 be two distinct integers such that

$1*18+k^2+8k-2=(k+4)^2$, a perfect square

Therefore, the pair $(1,18)$ represents diophantine 2-tuple with the property $D(k^2+8k-2)$.

If c is the 3rd tuple,then it satisfies the following system of double equations

$$c+k^2+8k-2=p^2 \quad (1)$$

$$18c+k^2+8k-2=q^2 \quad (2)$$

Eliminating c between (1) and (2), we have

$$18p^2-q^2=17(k^2+8k-2) \quad (3)$$

Taking

$$p=X+T\ ,\ q=X+18T \quad (4)$$

in (3) and simplifying we get

$$X^2=18T^2+k^2+8k-2$$

which is satisfied by $T=1\ ,\ X=k+4$

In view of (4) and (1), it is seen that

$$c=2k+27$$

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On Non - Homogeneous Cubic Equation With Four Unknowns $x^2 + y^2 + 4(35z^2 - 4 - 35w^2) = 6xyz$

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ABSTRACT
This paper is devoted to obtain non-zero distinct integer solutions to non-homogeneous cubic equation with four unknowns represented by $x^2 + y^2 + 4(3\ z^2 - 4 - 3\ w^2) = 6xyz$ along with few observations.

KEY WORDS: NON-HOMOGENEOUS, CUBIC WITH FOUR UNKNOWNS, INTEGER SOLUTIONS 2010 MATHEMATICS SUBJECT CLASSIFICATION: 11D09.

INTRODUCTION

The cubic Diophantine equations are rich in variety and offer an unlimited field for research. This paper concerns with another interesting cubic Diophantine equation with four unknowns $x^2 + y^2 + 4(3\ z^2 - 4 - 3\ w^2) = 6xyz$ for determining its infinitely many non-zero integral solutions.

Notations Used:

1. Regular Polygonal Number of rank n with sides m : $t_{m,n} = n[1 + \frac{(n-1)(m-1)}{2}]$
2. Pyramidal Number of rank n with sides m : $p_n^m = \frac{1}{6}[n(n+1)][(m-2)n + (5-m)]$
3. Pronic Number of rank n : $pr_n = n(n+1)$
4. Stella Octangular Number of rank n: $SO_n = n(2n^2 - 1)$
5. Octahedral Number of rank n: $OH_n = \frac{1}{3}n(2n^2 + 1)$
6. Star Number of rank n : $S_n = 6n(n-1) + 1$
7. Pentatope Number of rank n : $pt_n = \frac{n(n+1)(n+2)(n+3)}{24}$

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Method of Analysis: The homogeneous cubic equation with four unknowns to be solved is

$$x^2 + y^2 + 4(3\ z^2 - 4 - 3\ w^2) = 6xyz \quad (1)$$

Introducing the linear transformations

$$x = 2X + 2\ z,\ y = 4 \quad (2)$$

in (1), it leads to

$$X^2 = z^2 + 3\ w^2 \quad (3)$$

We present below different methods of solving (3) and thus, obtain different patterns of integral solutions to (1).

Pattern-I

It is observed that (3) is satisfied by

$$w = 2rs, z = 35r^2 - s^2, X = 35r^2 + s^2 \quad (4)$$

Hence, in view of (2) and (4), the non- zero integral solutions of (1) are given by

$x = x(r,s) = 490r^2 - 10s^2$

$y = y(r,s) = 4$

$z = z(r,s) = 35r^2 - s^2$

$w = 2rs$

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A search on the integer solutions of pell-like equation $ax^2-(a-1)y^2=a, a>1$

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Abstract

This paper deals with the problem of obtaining non-zero distinct integer solutions to the non-homogeneous binary quadratic equation represented by the Pell-like equation $ax^2-(a-1)y^2=a, a>1$. Different sets of integer solutions are presented. For illustration, the integer solutions to the above equation when a=11 are presented. The construction of second order Ramanujan Numbers is illustrated. Employing the solutions, a few relations among special polygonal numbers are obtained.

Keywords: non homogeneous binary quadratic, pell-like equation, hyperbola, integral solutions, special numbers

Introduction

The binary quadratic Diophantine equations of the form $ax^2-by^2=N,(a,b,N\neq 0)$ are rich in variety and have been analyzed by many mathematicians for their respective integer solutions for particular values of a, b and N. In this context, one may refer [1-17]. This paper deals with the problem of obtaining non-zero distinct integer solutions to the non-homogeneous binary quadratic equation represented by the Pell-like equation $ax^2-(a-1)y^2=a, a>1$. Different sets of integer solutions are presented. For illustration, the integer solutions to the above equation when a=11 are presented. In this example, the construction of second order Ramanujan Numbers with base numbers as real integers and Gaussian integers is illustrated and employing the solutions, a few relations among special polygonal numbers are obtained. A special Pythagorean triangle is also determined.

Method of Analysis

Let a (>1) be any positive integer. The Pell-like equation under consideration is

$$ax^2-(a-1)y^2=a, a>1 \tag{1}$$

The process of obtaining different choices of integer solutions to (1) is illustrated below:

Choice (1)

Taking

$$x=2k+1, y=2s \tag{2}$$

in (1), it is written as

$$a(k^2+k)=(a-1)s^2 \tag{3}$$

which is satisfied by

$$k=a-1, s=a \tag{4}$$

And

$$k=-a, s=a \tag{5}$$

In view of (2), the integer solutions to (1) are given by

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A Search On Non-distinct Integer Solutions To Cubic Diophantine Equation with Four Unknowns

$$x^2 - xy + y^2 + 4w^2 = 8z^3$$

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Abstract: The non-homogeneous cubic diophantine equation with four unknowns given by $x^2 - xy + y^2 + 4w^2 = 8z^3$ is analyzed for its non-zero non-distinct integer solutions through applying the linear transformtions .

Keywoeds: Cubic equation with four unknowns,Non-Homogeneous cubic,N0n-distinct integral solutions

Introduction:

The cubic diophantine equations are rich in variety and offer an unlimited field for research [1,2]. In particular, refer [3-24] for a few problems on cubic equation with 3 and 4 unknowns for obtaining non-zero distinct integer solutions.It seems that much work has not been done towards the determination of non-zero non-distinct integer solutions.Towards this end,this paper concerns with non-homogeneous cubic diophantine equation with four unknowns given by $x^2 - xy + y^2 + 4w^2 = 8z^3$ for determining its infinitely many non-zero non- distinct integral solutions by employing the linear transformations.

Method of Analysis:

The non-homogeneous cubic equation with four unknowns under consideration is

$$x^2 - xy + y^2 + 4w^2 = 8z^3 \qquad (1)$$

The above equation is studied for finding its non-zero non- distinct integer solutions through different ways as presented below:

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A Search On the Integer Solutions of Cubic Diophantine Equation with Four Unknowns $x^2+y^2+4(35z^2-4-w^2)=6xyz$

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Abstract

e cubic diophantine equation with four unknowns given by $x^2+y^2+4(35z^2-4-w^2)=6xyz$ *is analyzed for non-zero distinct integer solutions, through applying the linear transformtions* $x=2X+12z$, $y=4$ *and ploying the most cited solutions of the well-known pythagorean equation.*

ywords: Cubic equation with four unknowns, Integral solutions, pythagorean equation.

tations:

$$t_{20,n}=9n^2-8n$$

$$p_n^5=\frac{n^2(n+1)}{2}$$

troduction:

The cubic diophantine equations are rich in variety and offer an unlimited field for research [1,2]. In particular fer [3-24] for a few problems on cubic equation with 3 and 4 unknowns. This paper concerns with yet another teresting cubic diophantine equation with four unknowns given by $x^2+y^2+4(35z^2-4-w^2)=6xyz$ for termining its infinitely many non-zero distinct integral solutions by reducing it to pythagorean equation.

Method of Analysis:

The non-homogeneous cubic equation with four unknowns under consideratio is,

$$x^2+y^2+4(35z^2-4-w^2)=6xyz \quad (1)$$

To start with, it is observed that (1) is satisfied by the following quadraples:

$$(x,y,z,w)=(-12k,4,-70k,-35k),(70k,4,70k,35k),(70k,-4,-12k,35k),(-70k,-4,12k,-35k),$$
$$(70k,4,12k,-35k),(-70k,4,-12k,35k),(-70k,-4,12k,35k),(70k,-4,-12k,-35k)$$

However, there are other sets of solutions to (1) which are illustrated below:

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On The Homogeneous Cone $z^2 = 34x^2 + y^2$

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ABSTRACT

The homogeneous ternary quadratic equation given by $z^2 = 34x^2 + y^2$ is analysed for its non-zero distinct integer solutions through different methods. A few interesting properties between the solutions are presented. Also, formulae for generating sequence of integer solutions based on the given solution are presented.

Keywords: Ternary quadratic, Integer solutions, Homogeneouscone

Introduction

It is well known that the quadratic Diophantine equations with three unknowns (homogeneous or non-homogeneous) are richin variety [1, 2]. In particular, ternary quadratic Diophantine equations of the form $z^2 = Dx^2 + y^2$ are analysed for values of D=29,41,43,47, 53, 55, 61, 63, 67in [3-11]. In this communication, yet another interestinghomogeneousternary quadratic diophantine equation given by $z^2 = 34x^2 + y^2$ is analysed forits non-zero distinct integer solutions through different methods. A few interesting properties between the solutions are presented. Also, formulas for generating sequence of integer solutions based on the given solution are presented.

2. Methods of Analysis

The ternary quadratic equation to be solved for its integer solutions is

$$z^2 = 34x^2 + y^2 \quad (1)$$

We present below different methods of solving (1):

Method 1

(1) is written in the form of ratio as

$$\frac{z+y}{34x} = \frac{x}{z-y} = \frac{\alpha}{\beta}, \beta \neq 0 \quad (2)$$

which is equivalent to the system of double equations

$34\alpha x - \beta y - \beta z = 0$

$\beta x + \alpha y - \alpha z = 0$

Applying the method of cross-multiplication to the above system of equations,

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Research Article

A Search For Integral Solutions To The Ternary Bi-Quadratic Equation $x^4+x^3y+x^2y^2+xy^3+y^4=(x+y)^2+1+z^2$

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ABSTRACT :This paper deals with the problem of obtaining non-zero distinct integer solutions to the ternary bi-quadratic equation $x^4+x^3y+x^2y^2+xy^3+y^4=(x+y)^2+1+z^2$. A few interesting relations among the solution are presented. Given on integer solution of the equation under consideration, integer solutions for various choices of hyperbola and parabolas are exhibited. The formulation of second order Ramanujan Numbers with base numbers as real integers and Gaussian integers is illustrated and also the sequence of Diophantine 3-tuples are exhibited.

Keywords: Ternary bi-quadratic, integer solutions, parabolas, hyperbolas, Second order Ramanujan numbers, sequence of Diophantine 3-tuples

INTRODUCTION

In number theory, Diophantine equations play a significant role and have a marvellous effects on credulous people. They occupy a remarkable position due to unquestioned historical importance. The subject of Diophantine equation is quite difficult. Every century has seen the solution of more mathematical problem than the century before and yet many mathematical problem, both major and minor still remains unsolved. It is hard to tell whether a given equation has solution or not and when it does, there may be no method to find all of them. It is difficult to tell which are early solvable and which require advanced techniques. There is no well unified body of knowledge concerning general methods. A Diophantine problem is considered as solved if a method is available to decide whether the problem is solvable or not and in case of its solvability, to exhibit all integers satisfying the requirements set forth in the problem. Many researchers in the subjects of Diophantine equation exhibit great interest in homogeneous and non-homogeneous bi-quadratic Diophantine equations. In this context, are may refer [1-12]. This communication concerns yet another interesting ternary bi-quadratic equation given by $x^4+x^3y+x^2y^2+xy^3+y^4=(x+y)^2+1+z^2$ and is studied for its non-zero distinct integer solution. A few interesting relations among the solution are presented. Given an integer solution of the equation under consideration, integer solutions for various choices of hyperbola and parabolas are exhibited. The formulation of second order Ramanujan Numbers with base numbers as real integers and Gaussian integers is illustrated and also the sequence of Diophantine 3-tuples are exhibited.

METHOD OF ANALYSIS

The ternary bi-quadratic equation under consideration is

$$x^4+x^3y+x^2y^2+xy^3+y^4=(x+y)^2+1+z^2 \quad (1)$$

Introduction of the transformations

$$x=u+v,\ y=u-v,\ z=4uv,\ u\neq v\neq 0 \quad (2)$$

in (1) leads to

$$v^4-6u^2v^2+5u^4-4u^2-1=0 \quad (3)$$

Treating (3) as a quadratic in v^2 and solving for v^2, we've

$$v^2=5u^2+1 \quad (4)$$

which is the well known pellian equation whose general solution given by,

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On the Positive Pellian Equation $y^2 = 35x^2 + 29$

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ABSTRACT

The binary quadratic equation represented by the Positive Pellian $y^2 = 35x^2 + 29$ is analyzed for its distinct integer solutions. A few interesting relations among the solutions are given. Further, employing the solutions of the above hyperbola, we have obtained solutions of other choices of hyperbola and parabola. The formulation of second order Ramanujan numbers is illustrated.

Keywords: Binary quadratic, hyperbola, parabola, pell equation, integral solutions, second order Ramanujan numbers 2010 mathematics subject classification: 11D09

INTRODUCTION

A binary quadratic equation of the form $y^2 = Dx^2 + 1$ where D is non-square positive integer has been studied by various mathematicians for its non-trivial integral solutions when D takes different integral values [1-2]. For an extensive review of various problems, one may refer [3-12]. In this communication, yet another interesting hyperbola given by $y^2 = 35x^2 + 29$ is considered and infinitely many integer solutions are obtained. A few interesting properties among the solutions are obtained.

Method of Analysis

Consider the positive pell equation

$$y^2 = 35x^2 + 29 \qquad (1)$$

which is satisfied by

$$x_0 = 2, y_0 = 13$$

To obtain the other solutions of (1), consider the pellian equation

$$y^2 = 35x^2 + 1 \qquad (2)$$

Initial solution is given by

$$\tilde{x}_0 = 1, \tilde{y}_0 = 6$$

The general solution $(\tilde{x}_n, \tilde{y}_n)$ of (2) is obtained by

$$\tilde{x}_n = \frac{1}{2\sqrt{35}} g_n \, , \, \tilde{y}_n = \frac{1}{2} f_n$$

where

$$f_n = (6 + \sqrt{35})^{n+1} + (6 - \sqrt{35})^{n+1}$$

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ON THE TRANSCENDENTAL EQUATION

$$\sqrt[2]{y^2+2x^2}+\sqrt[3]{Y^2+X^2}=35z^3$$

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ABSTRACT

The transcendental equation with five unknowns involving surds represented by the diophantine equation $\sqrt[2]{y^2+2x^2}+\sqrt[3]{Y^2+X^2}=35z^3$ is analysed for its patterns for non-zero distinct integer solutions

KEYWORDS: Transcendental equation, integer solutions, surd equation

I. INTRODUCTION

Diophantine equations have an unlimited field of research by reason of their variety. Most of the Diophantine problems are algebraic equations [1,2]. In [3-18], the integral solutions of transcendental equations involving surds are analyzed for their respective integer solutions. This communication analyses a transcendental equation with five unknowns given by $\sqrt[2]{y^2+2x^2}+\sqrt[3]{Y^2+X^2}=35z^3$. Infinitely many non-zero integer quintuples (x,y,z,m,n) satisfying the above equation are obtained

II. METHOD OF ANALYSIS

The transcendental equation involving surds to be solved is

$$\sqrt[2]{y^2+2x^2}+\sqrt[3]{Y^2+X^2}=35z^3 \qquad (1)$$

The introduction of the transformations

$$x=2mn, y=2m^2-n^2, Y=m(m^2+n^2), X=n(m^2+n^2) \qquad (2)$$

in (1) leads to

$$3m^2+2n^2=35z^3 \qquad (3)$$

which is satisfied by

$$m=3k^3, n=2k^3 \qquad (4)$$

$$z=k^2, k\neq 0 \qquad (5)$$

In view of (2), one obtains

$$x=12k^6, y=14k^6, Y=39k^9, X=26k^9 \qquad (6)$$

Thus (5) and (6) represent the integer solutions to (1).

Also, introducing the linear transformations

$$m=\alpha+2\beta, n=\alpha-3\beta \qquad (7)$$

in (3), it is written as

$$\alpha^2+6\beta^2=7z^3 \qquad (8)$$

Assume

On the homogeneous quadratic Diophantine equation with three unknowns

$$7x^2 + y^2 = 448z^2$$

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Abstract : The ternary quadratic equation given by $4x^2 - 12xy + 21y^2 = 13z^2$ isconsidered and searched for its many different integer solution . Five different choices of integer solution of the above equations are presented .A few interesting relations between the solutions and special polygonal numbers are presented.

Key words: ternary quadratic, integer solutions

MSC **subject classification :11D09**

1.INTRODUCTION:

The Diophantine equation offer an unlimited field for research due to their variety[1-3].In particular ,one may refer [4-15] for quadratic equations with three unknowns . This communication concerns with yet another interesting equation $4x^2 - 12xy + 21y^2 = 13z^2$ representing homogeneous equation with three for determining its infinitely Many non -zero integral points. Also ,few interesting relations among the solutions are presented.

2.NOTATIONS:

- $t_{m,n} = n^{th}$ term of a regular polygon with m sides.

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On the homogeneous Ternary Quadratic Equation

$$x^2+10xy+32y^2=8z^2$$

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Abstract: The ternary quadratic equation given by $x^2+10xy+32y^2=8z^2$ is considered and searched for its many different integer solution. Five different choices of integer solution of the above equations are presented. A few interesting relations between the solutions and special polygonal numbers are presented.

Key Words: ternary quadratic, integer solutions

MSC subject classification: 11D09

1. INTRODUCTION:

The Diophantine equations offer an unlimited field for research due to their variety [1-3]. In particular, one may refer [4-8] for quadratic equations with three unknowns. This communication concerns with yet another interesting equation $x^2+1xy+32y^2=8z^2$ representing homogeneous equation with three for determining its infinitely many non-zero integral points. Also, few interesting relations among the solutions are presented.

2. NOTATIONS:

- $t_{m,n}=n^{th}$ term of a regular polygon with m sides.

  $$=n\left(1+\frac{(n-1)(m-2)}{2}\right)$$

- P_{r_n} = pronic number of rank n

  $$=n(n+1)$$

3. METHOD OF ANALYSIs

The Quadratic Diophantine equation with three unknowns to be solved is given by

$$x^2+10xy+32y^2=8z^2 \qquad (1)$$

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ON THE TERNARY QUADRATIC DIOPHANTINE EQUATION $x^2+3y^2=19z^2$

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STRACT:

The homogeneous ternary quadratic Diophantine equation represented by $x^2+3y^2=19z^2$ tudied for finding its non-zero distinct integer solutions. The formulae for generating sequence of eger solutions based on the given solution are exhibited.

ywords: Homogeneous Ternary Quadratic, Integral solutions

TRODUCTION

Ternary quadratic equations are rich in variety [1-4, 17-19]. For an extensive review of ble literature and various problems, one may refer [5-16]. In this communication, we consider yet other interesting homogeneous ternary quadratic equation $x^2+3y^2=19z^2$ and obtain infinitely ny non-trivial integral solutions. Also, the formulae for generating sequence of integer solutions sed on the given solution are exhibited.

ETHOD OF ANALYSIS:

t x,y,z be any three non-zero distinct integers such that

$$x^2+3y^2=19z^2 \tag{1}$$

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On sequences of Diophantine 3-tuples generated through the pair (9,2) each with property D(-2), D(-9), D(-14), D(-17)

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stract

s paper aims at formulating sequences of Diophantine 3-tuples based on the Diophantine 2-tuple with properties $D(-2), D(-9), D(-14), D(-17)$ respectively.

ywords: Diophantine 3-tuple; sequence of Diophantine 3-tuples

roduction

problem of constructing the sets with property that product of any two of its distinct elements is one less than a square has ry long history and such sets have been studied by Diophantus. A set of m distinct positive integers $\{a_1, a_2, a_3, \ldots, a_m\}$ is said to have the property $D(n), n \in Z - \{0\}$ if $a_i a_j + n$ is a perfect square for all $1 \le i < j \le m$ $1 \le j < i \le m$ and such a set is called a Diophantine m-tuple with property $D(n)$.

ny Mathematicians considered the construction of different formulations of diophantine triples with the property $D(n)$ for arbitrary integer n [1] and also, for any linear polynomials in n. In this context, one may refer [2, 12] for an extensive review various problems on diophantine triples.

is paper concerns with the construction of sequences of diophantine 3-tuples (a, b, c) such that the product of any two ments of the set added by (-2),(-9),(-14),(-17) in turn is a perfect square.

quence: 1

$a = 9, \; b = 2$

s observed that

$ab - 2 = 16$, a perfect square

erefore, the pair (a, b) represents diophantine 2-tuple with the property $D(-2)$.

c_1 be any non-zero polynomial such that

$$ac_1 - 2 = p^2 \tag{1}$$

$$bc_1 - 2 = q^2 \tag{2}$$

iminating c_1 between (1) and (2), we have

$$bp^2 - aq^2 = (b-a)(-2) \tag{3}$$

nsidering the linear transformations

$$p = X + aT, \; q = X + bT \tag{4}$$

(3) and simplifying, we get

$$X^2 = abT^2 - 2$$

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ON THE FAMILY OF HYPERBOLAS

$$w^2 - 6z^2 + 2aw - 12bz - 6b^2 = 0$$

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Abstract - The family of hyperbolas represented by the non-homogeneous binary quadratic equation $w^2 - 6z^2 + 2aw - 12bz - 6b^2 = 0\ (a, b \neq 0)$ *is considered to obtain its non-zero distinct integer solutions. A few fascinating relations among its solutions are exhibited. Construction of second order Ramanujan numbers and Pythagorean triples are illustrated.*

Keywords: Non-homogeneous quadratic, binary quadratic, positive pell equation, integer solutions, second order Ramanujan numbers, Pythagorean triples.

Mathematics Subject Classification: 11D09

INTRODUCTION

A binary quadratic equation of the form $y^2 = Dx^2 + 1$, where D is non-square positive integer has been studied by various mathematicians for its non-trivial integral solutions when D takes different integral values [1-2]. For an extensive review of various problems, one may refer [3-17]. In this communication, yet another interesting hyperbola given by $w^2 - 6z^2 + 2aw - 12bz - 6b^2 = 0$ isconsidered and infinitely many integer solutions are obtained. A few interesting properties among the solutions are obtained. Further, employing the solutions of the above hyperbola, we have obtained solutions of other choices of hyperbola, parabola. Formulation of second order Ramanujan numbers and Pythagorean triples are illustrated.

METHOD OF ANALYSIS

The family of hyperbolas under consideration is

$$w^2 - 6z^2 + 2aw - 12bz - 6b^2 = 0 \qquad (1)$$

Where a and b are both non-zero integers.

The completion of squares on the lefts of (1) leads to the positive pell equation

$$Y^2 = 6X^2 + a^2 \qquad (2)$$

Where

$$Y = w + a \quad , \quad X = z + b \qquad (3)$$

After performing some algebra, the general solution (X_{n+1}, Y_{n+1}) to (2) is given by

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Year 2021, Volume 9, Issue 2

Study On the Hyperbola $9x^2 - 7y^2 = 8$

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... - The hyperbola represented by the binary quadratic equation 9x^2-7y^2=8 is analyzed for finding its non-... ...inct integer solutions. A few interesting relations among its solutions are presented. Also, knowing an integral ... of the given hyperbola, integer solutions for other choices of hyperbolas and parabolas are presented. The ...ation of second order Ramanujan Numbers with base numbers as real integers and Gaussian integers is ...ted.

...s - Hyperbola, pell-like equation, non-homogeneous quadratic, integer solutions, second order Ramanujan

...RODUCTION

...binary quadratic Diophantine equations of the form $ax^2 - by^2 = N,(a,b,N \neq 0)$ are rich in variety and have been ...d by many mathematicians for their respective integer solutions for particular values of a, b and N. In this context, ...refer [1-14].

...This communication concerns with the problem of obtaining non-zero distinct integer solutions to the binary ...e equation given by $9x^2 - 7y^2 = 8$ representing hyperbola. A few interesting relations among its solutions are ...d. Knowing an integral solution of the given hyperbola, integer solutions for other choices of hyperbolas and ...s are presented. The formulation of second order Ramanujan Numbers with base numbers as real integers and ...n integers is illustrated.

...THOD OF ANALYSIS

...phantine equation representing the binary quadratic to be solved for its non-zero distinct integer solutions is

$$9x^2 - 7y^2 = 8 \tag{1}$$

...t the linear transformations

$$x = X + 7T,\ y = X + 9T \tag{2}$$

...(1) and (2), we have

$$X^2 = 63T^2 + 4 \tag{3}$$

...smallest positive integer solution is

$$X_0 = 16,\ T_0 = 2$$

...d the other solutions of (3), consider the pell equation

$$X^2 = 63T^2 + 1 \tag{4}$$

...smallest positive integer solution is $(\widetilde{X}_0, \widetilde{T}_0) = (16, 2)$

...eral solution of (4) is given by

$$\widetilde{T}_n = \frac{1}{2\sqrt{63}} g_n,\ \widetilde{X}_n = \frac{1}{2} f_n$$

$$f_n = \left(8 + \sqrt{63}\right)^{n+1} + \left(8 - \sqrt{63}\right)^{n+1}$$

$$g_n = \left(8 + \sqrt{63}\right)^{n+1} - \left(8 - \sqrt{63}\right)^{n+1},\ n = 0, 1, 2, 3, \ldots$$

...ng Brahmagupta lemma between (X_0, T_0) and $(\widetilde{X}_n, \widetilde{T}_n)$ we have

$$T_{n+1} = T_0 \widetilde{X}_n + X_0 \widetilde{T}_n$$

$$X_{n+1} = X_0 \widetilde{X}_n + D T_0 \widetilde{T}_n$$

$$\Rightarrow T_{n+1} = f_n + \frac{8}{\sqrt{63}} g_n \tag{5}$$

On the non-homogeneous cubic diophantine equation with four unknowns

$$x^2+y^2+4\left((2k^2-2k)^2z^2-4-w^2\right)=(2k^2-2k+1)xyz$$

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Abstract: The non-homogeneous cubic diophantine equation with four unknowns given by $x^2+y^2+4\left((2k^2-2k)^2z^2-4-w^2\right)=(2k^2-2k+1)xyz$ is analyzed for its non-zero distinct integer solutions through applying the linear transformtions and reducing it to pythagorean equation.

Keywords: Cubic equation with four unknowns,Non-homogeneous cubic, Integral solutions, Pythagorean equation.

Introduction:

The cubic diophantine equations are rich in variety and offer an unlimited field for research [1,2]. In particular refer [3-24] for a few problems on cubic equation with 3 and 4 unknowns. This paper concerns with an interesting non-homogeneous cubic diophantine equation with four unknowns given by $x^2+y^2+4\left((2k^2-2k)^2z^2-4-w^2\right)=(2k^2-2k+1)xyz$ for determining its infinitely many non-zero distinct integral solutions by reducing it to pythagorean equation.

Method of Analysis:

The non-homogeneous cubic equation with four unknowns under consideration is

$$x^2+y^2+4\left((2k^2-2k)^2z^2-4-w^2\right)=(2k^2-2k+1)xyz \quad (1)$$

Employing the linear transformations

$$x=2X+2(2k^2-2k+1)z \quad , \quad y=4 \quad (2)$$

in (1),it reduces to the equation

$$X^2=(2k-1)^2z^2+w^2 \quad (3)$$

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A Search on the Integer Solutions to Ternary Quadratic Diophantine Equation

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ABSTRACT: The homogeneous ternary quadratic diophantine equation given by $z^2 = 11x^2 + y^2$ is analyzed for its non-zero distinct integer solutions through different methods. A few interesting properties between the solutions are presented.Also, formula for generating sequence of integer solutions based on the given solutions are presented.

Keywords: Ternary quadratic, Integer solutions, Homogeneous cone.

Notation:

$$t_{m,n} = n\left[1 + \frac{(n-1)(m-2)}{2}\right]$$

$$P_5^n = \frac{n^2(n+1)}{2}$$

I. INTRODUCTION:

It is well known that the quadratic diophantine equations with three unknowns (homogenous (or) non-homogenous) are rich in variety [1, 2]. In particular, the ternary quadratic diophantine equations of the form $z^2 = Dx^2 + y^2$ are analyzed for values of $D = 29,41,43,47,55,61,63,67$ in [3-10]. In this communication, the homogeneous ternary quadratic diophantine equation given by $z^2 = 11x^2 + y^2$ is analyzed for its non-zero distinct integer solutions through different methods. A few interesting properties between the solutions are presented. Also, formulas for generating sequence of integer solutions based on the given solutions are presented.

II. METHOD OF ANALYSIS

The ternary quadratic diophantine equation to be solved for its integer solutions is

$$z^2 = 11x^2 + y^2 \qquad (1)$$

We present below different methods of solving (1)

Method: 1

(1) is written in the form of ratio as

$$\frac{z+y}{x} = \frac{11x}{z-y} = \frac{\alpha}{\beta}, \beta \neq 0 \qquad (2)$$

which is equivalent to the system of double equations

$$\alpha x - \beta y - \beta z = 0$$

$$11x\beta + \alpha y - \alpha z = 0$$

Applying the method of cross-multiplication to the above system of equations, one obtains

ON THE HOMOGENEOUS QUADRATIC DIOPHANTINE EQUATION WITH THREE UNKNOWNS

$$4x^2 - 12xy + 21y^2 = 13z^2$$

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ABSTRACT

The ternary quadratic equation given by $4x^2 - 12xy + 21y^2 = 13z^2$ is considered and searched for its many different integer solution . Five different choices of integer solution of the above equations are presented .A few interesting relations between the solutions and special polygonal numbers are presented.

KEY WORDS: *ternary quadratic, integer solutions*
MSC subject classification :11D09

1. INTRODUCTION

The Diophantine equation offer an unlimited field for research due to their variety [1-3].In particular ,one may refer [4-15] for quadratic equations with three unknowns . This communication concerns with yet another interesting equation $4x^2 - 12xy + 21y^2 = 13z^2$ representing homogeneous equation with three for determining its infinitely Many non -zero integral points. Also , few interesting relations among the solutions are presented.

2. NOTATIONS

- $t_{m,n} = n^{th}$ term of a regular polygon with m sides.

  $= n\left(1 + \frac{(n-1)(m-2)}{2}\right)$

- Pr_n = pronic number of rank n

  $= n(n+1)$

ON THE HOMOGENEOUS TERNARY QUADRATIC EQUATION $7x^2+3y^2=220z^2$

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ABSTRACT

The ternary quadratic equation given by $7x^2+3y^2=220z^2$ *is considered and searched for its many different integer solution. Five different choices of integer solution of the above equations are presented. A few interesting relations between the solutions and special polygonal numbers are presented.*

KEY WORDS: *ternary quadratic, integer solutions*
MSC subject classification: **11D09**

1. INTRODUCTION

The Diophantine equations offer an unlimited field for research due to their variety [1-3]. In particular, one may refer [4-8] for quadratic equations with three unknowns. This communication concerns with yet another interesting equation $7x^2+3y^2=220z^2$ representing homogeneous equation with three for determining its infinitely many non-zero integral points. Also, few interesting relations among the solutions are presented.

2. NOTATIONS

- $t_{m,n}=n^{th}$ term of a regular polygon with m sides.

$$=n\left(1+\frac{(n-1)(m-2)}{2}\right)$$

- p_{r_n} = pronic number of rank n

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A STUDY ON THE PELL –LIKE EQUATION $3x^2 - 8y^2 = -20$

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ABSTRACT

The hyperbola represented by the binary quadratic equation $3x^2 - 8y^2 = -20$is analyzed for finding its non-zero distinct integer solutions. A few interesting relations among its solutions are presented. Also, knowing an integral solution of the given hyperbola, integer solutions for other choices of hyperbolas and parabolas are presented. The formulation of second order Ramanujan Numbers with base numbers as real integers and Gaussian integers is illustrated and also the sequence of Diophantine 3-tuples are exhibited.

Keywords: Pell like equation, Binary quadratic, Hyperbola, Parabola, 2nd order Ramanujan numbers, sequence of Diophantine 3-tuples.

I. INTRODUCTION:

The binary quadratic Diophantine equations of the form $ax^2 - by^2 = N, (a, b, N \neq 0)$ are rich in variety and have been analyzed by many mathematicians for their respective integer solutions for particular values of a, b and N. In this context, one may refer [1-11].

This communication concerns with the problem of obtaining non-zero distinct integer solutions to the binary quadratic equation given by $3x^2 - 8y^2 = -20$ representing hyperbola. A few interesting relations among its solutions are presented. Knowing an integral solution of the given hyperbola, integer solutions for other choices of hyperbolas and parabolas are presented. The formulation of second order Ramanujan Numbers with base numbers as real integers and Gaussian integers is illustrated and also the sequence of Diophantine 3-tiples are presented.

II. METHOD OF ANALYSIS

The hyperbola represented by the non-homogeneous quadratic equation under consideration is

$$3x^2 - 8y^2 = -20 \quad (1)$$

Introduction of the linear transformations

$$x = X + 8T, y = X + 3T \quad (2)$$

in (1)leads to

$$X^2 = 24T^2 + 4 \quad (3)$$

The smallest positive integer solution for (3) is T_0=2, X_0=10

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OBSERVATION ON THE TERNARY QUADRATIC DIOPHANTINE EQUATION WITH THREE UNKNOWNS $13x^2+3y^2=640z^2$

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Abstract:

The ternary quadratic equation given by $13x^2+3y^2=640z^2$ is considered and searched for its many different integer solution. Seven different choices of integer solution of the above equations are presented. A few interesting relations between the solutions and special polynomial numbers are presented.

Keywords: Ternary quadratic, integer solutions

Notation:

$$t_{m,n}=n\left[1+\frac{(n-1)(m-2)}{2}\right]$$

$$PR_n=n(n+1)$$

$$G_n=2n-1$$

INTRODUCTION :

The Diophantine equations offer an unlimited field for research due to their variety [1-3]. In particular , one may refer [4-12] for quadratic equations with three unknowns. This communication concerns with yet another interesting equation $13x^2+3y^2=640z^2$ representing homogeneous equation with three unknowns for determining its infinitely many non-zero integral points. Also,few interesting relations among the solutions are presented.

METHOD OF ANALYSIS

The Quadratic Diophantine equation with three unknowns to be solved is given by,

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Observations on the Surd Equation

$$\sqrt{2z-4}=\sqrt{x+\sqrt{(m^2+4)y}}+\sqrt{x+\sqrt{(m^2+4)y}}\ (m\neq 0)$$

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Abstract:

In this paper, non-zero integer solutions to the surd equation with three unknowns given by $\sqrt{2z-4}=\sqrt{x+\sqrt{(m^2+4)y}}+\sqrt{x-\sqrt{(m^2+4)y}}$ are obtained.

Keywords: surd equation, transcendental equation ,integer solutions

Introduction:

Diophantine equations have an unlimited field of research by reason of their variety. Most of the Diophantine problems are algebraic equations [1,2]. In [3-18], the integral solutions of transcendental equations involving surds are analyzed for their respective integer solutions.

This communication analyses a transcendental equation with three unknowns given by $\sqrt{2z-4}=\sqrt{x+\sqrt{(m^2+4)y}}+\sqrt{x-\sqrt{(m^2+4)y}}$. Infinitely many non-zero integer triples (x,y,z) satisfying the above equation are obtained.

Notations:

$t_n=\frac{n(n+1)}{2}$

$P_n^5=\frac{n^2(n+1)}{2}$

Observations On The Surd Equation

$$\sqrt{2z-4}=\sqrt{x+\sqrt{(m^2+k)y}}+\sqrt{x-\sqrt{(m^2+k)y}}\ (m\neq 0)$$

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Abstract:

In this paper, non-zero integer solutions to the surd equation with three unknowns given by $\sqrt{2z-4}=\sqrt{x+\sqrt{(m^2+k)y}}+\sqrt{x-\sqrt{(m^2+k)y}}$ are obtained.

Keywords: surd equation, transcendental equation ,integer solutions

Introduction:

Diophantine equations have an unlimited field of research by reason of their variety. Most of the Diophantine problems are algebraic equations [1,2]. In [3-18], the integral solutions of transcendental equations involving surds are analyzed for their respective integer solutions.

This communication analyses a transcendental equation with three unknowns given by $\sqrt{2z-4}=\sqrt{x+\sqrt{(m^2+k)y}}+\sqrt{x-\sqrt{(m^2+k)y}}$. Infinitely many non-zero integer triples (x,y,z) satisfying the above equation are obtained.

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On the non-homogeneous ternary cubic equation $3(x^2+y^2)-2xy+4(x+y)+4=51z^3$

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Abstract

The cubic equation with three unknowns given by $3(x^2+y^2)-2xy+4(x+y)+4=51z^3$ is analysed for its different patterns of non-zero distinct integer solutions.

Keywords: Ternary cubic, non-homogeneous cubic, integer solutions

Introduction

The Diophantine equations offer an unlimited field for research due to their variety [1, 2]. In particular, one may refer [3-16] for cubic equations with three unknowns. This communication concerns with yet another interesting equation $3(x^2+y^2)-2xy+4(x+y)+4=51z^3$ representing non- homogeneous cubic equation with three unknowns for determining its infinitely many non-zero integral points.

Method of Analysis

The ternary cubic equation to be solved is

$$3(x^2+y^2)-2xy+4(x+y)+4=51z^3 \tag{1}$$

Introducing the linear transformations

$$x=u+v,\ y=u-v,\quad (u\neq v\neq 0) \tag{2}$$

In (1), it is written as

$$(2u+2)^2+8v^2=51z^3 \tag{3}$$

Now, (3) is solved through different ways and using (2), different sets of integer solutions to (1) are obtained.

Way 1

Assume

$$z=a^2+8b^2 \tag{4}$$

Write 51 as $51=(7+i\sqrt{2})(7-i\sqrt{2})$ $\quad (5)$

Using (4) and (5) in (3) and applying factorization, it is written as

$((2u+2)+i2\sqrt{2}\,v)((2u+2)-i2\sqrt{2}v))=(7+i\sqrt{2})(7-i\sqrt{2})(a+i2\sqrt{2}b)^3\,(a-i2\sqrt{2}b)^3$ Which is equivalent

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ON HOMOGENEOUS CUBIC EQUATION WITH FOUR UNKNOWNS $x^3-y^3=4(w^3-z^3)+6(x-y)^3$

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Abstract

This paper concerns with the problem of obtaining non-zero distinct integer solutions to homogeneous cubic equation with four unknowns given by $x^3-y^3=4(w^3-z^3)+6(x-y)^3$. A few interesting properties among the solutions are presented.

Keywords:

homogeneous cubic, cubic with four unknowns ,integer solutions

Notation:

$$t_{m,n}=n\left(1+\frac{(n-1)(m-2)}{2}\right)$$

Introduction:

The cubic diophantine equations are rich in variety and offer an unlimited field for research [1,2]. In particular refer [3-24] for a few problems on cubic equation with 3 and 4 unknowns. This paper concerns with yet another interesting non-homogeneous cubic diophantine equation with four unknowns given by $x^3-y^3=4(w^3-z^3)+6(x-y)^3$ for determining its infinitely

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Research Article

Observations on the Negative Pell Equation $y^2 = 10x^2 - 54$

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ABSTRACT

The binary quadratic Diophantine equation represented by the negative pellian $y^2 = 10x^2 - 54$ is analysed for its non-zero distinct solutions. A few interesting relations among the solutions are given. Further, employing the solutions of the above hyperbola, we have obtained some second order Ramanujan numbers and solutions of other choices of hyperbolas, parabolas.

Keywords: Binary quadratic, Hyperbola, Parabola, Integral solutions, Pell equation.

2010 Mathematics subject classification 11D09

INTRODUCTION:

The binary quadratic equations of the form $y^2 = Dx^2 + 1$ where D is non-square positive integer has been selected by various mathematicians for its non-trivial integer solutions where D takes different integral values[1-4]. For an extensive review of various problems, one may refer [5-10]. In this communication, yet another interesting equation given by $y^2 = 10x^2 - 54$ is considered and infinitely many integer solutions are obtained. A few interesting properties among the solutions are presented.

METHOD OF ANALYSIS:

The negative pell equation representing hyperbola under consideration is

$$y^2 = 10x^2 - 54 \qquad (1)$$

The smallest positive integer solutions of (1) are, $x_0 = 3, y_0 = 6$.

Consider the pellian equation $y^2 = 10x^2 + 1 \qquad (2)$

The initial solutions of (2) are $\tilde{x}_0 = 6, \tilde{y}_0 = 19$.

The general solution $(\tilde{x}_n, \tilde{y}_n)$ of (2) is given by

$$\tilde{x}_n = \frac{1}{2\sqrt{10}} g_n, \tilde{y}_n = \frac{1}{2} f_n \quad \text{where } f_n = \left(19 + 6\sqrt{10}\right)^{n+1} + \left(19 - 6\sqrt{10}\right)^{n+1}$$

$$g_n = \left(19 + 6\sqrt{10}\right)^{n+1} - \left(19 - 6\sqrt{10}\right)^{n+1}$$

ON THE HOMOGENEOUS CONE $z^2 = 14x^2 + y^2$

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ABSTRACT

The non-zero unique integer solutions to the homogeneous Ternary quadratic equation given by $z^2 = 14x^2 + y^2$ are investigated using various methods. There are some intriguing properties among the solutions. There are also formulas for generating an array of integer solutions from a single solution.

Keywords: Ternary quadratic, Integer solutions, Homogeneouscone.

Notation:

$$t_{m,n} = n\left[1 + \frac{(n-1)(m-2)}{2}\right]$$

I. INTRODUCTION

It is well known that the quadratic Diophantine equations with three unknowns (homogeneous or non-homogeneous) are rich in variety [1, 2]. In particular, the ternary quadratic Diophantine equations of the form $z^2 = Dx^2 + y^2$ are analysed for values of D=29,41,43,47, 53, 55, 61, 63, 67in [3-11]. In this communication, Diophantine equation $z^2 = 14x^2 + y^2$ is an important homogeneous trinity in these interactions, and different methods were used to find non-zero special whole solutions. There are some intriguing properties among the solutions. There are also formulas for generating an array of integer solutions from a single solution.

II. METHODS OF ANALYSIS

For its integer solutions, the triple quadratic equation must be solved. $z^2 = 14x^2 + y^2$ (1)

We present below different methods of solving (1):

Method 1

Written in the form of ratio as

$$\frac{z+y}{14x} = \frac{x}{z-y} = \frac{\alpha}{\beta}, \beta \neq 0 \quad (2)$$

which is equivalent to the system of double equations

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ON THE NEGATIVE PELL EQUATION

$y^2 = 10x^2 - 9$

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ABSTRACT:

The binary quadratic equation represented by the negative pellian $y^2 = 10x^2 - 9$ is analyzed for its distinct integer solutions. A few interesting relations among the solutions are given. Further, employing the solutions of the above hyperbola. We have obtained solutions of other choices of hyperbolas and special Pythagorean triangle.

KEYWORDS: Binary quadratic, hyperbola, parabola, integral solutions, pell equation.

2010 mathematics subject classification: 11D09.

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ON THE NEGATIVE PELL EQUATION

$y^2 = 3x^2 - 2$

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ABSTRACT:

The binary quadratic equation represented by the negative pellian $y^2 = 3x^2 - 2$ is analyzed for its distinct integer solutions. A few interesting relations among the solutions are also given. Further, employing the solutions of the above hyperbola, we have obtained solutions of other choices of hyperbola, parabola and special Pythagorean triangle.

KEYWORDS: Binary quadratic, hyperbola, parabola, integral solutions, Pell equations.

2010 mathematics subject classification: 11D09.

INTRODUCTION:

Diophantine equation of the form $y^2 = Dx^2 + 1$, where D is a given positive square – free integer is known as Pell equation and is one of the oldest Diophantine equation that has interesting mathematicians all over the world, since antiquity, J.L. Lagrange proved that the positive Pell equation $y^2 = Dx^2 + 1$ has infinitely many distinct integer solutions where as the negative Pell equation $y^2 = Dx^2 - 1$ does not always have a solution. In [1], an elementary proof of a criterium for the solvability of the Pell equation $X^2 - Dy^2 = -1$ where D is any positive non - square integer has been presented. For examples the equations $y^2 = 3x^2 - 1$, $y^2 = 7x^2 - 4$ have no integer solution whereas $y^2 = 65x^2 - 1$, $y^2 = 202x^2 - 1$ have integer

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On The Surd Equation

$$\sqrt{2z}=\sqrt{x+iy}+\sqrt{x-iy}$$

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...tract

In this short paper, non-zero integer distinct integer solutions to the surd equation with three ...owns given by $\sqrt{2z}=\sqrt{x+iy}+\sqrt{x-iy}$ are obtained through the ...ger solutions of Pythagorean equation.

...words: surd equation, transcendental equation, integer solutions

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Diophantine equations have an unlimited field of research by reason of their variety. Most of the ...phantine problems solved by the researchers are algebraic equations [1,2].

...seems that much work has not been done in finding the integer solutions to transcendental equation ...lving surds. In this context, refer [3-18] to the integral solutions of transcendental equations involvin... ...s. This short communication analyses a transcendental equation with three unknowns given b... $\sqrt{2z}=\sqrt{x+iy}+\sqrt{x-iy}$. Infinitely many non-zero integer triples (x,y,z) satisfying the above equation ar... ...ined through employing the integer solutions to the well-known Pythagorean equation.

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On The Surd Equation $\sqrt{2z}=\sqrt{x+\alpha y}+\sqrt{x-\alpha y}\ (\alpha\neq 0)$

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Abstract: In this short paper, non-zero integer distinct integer solutions to the surd equation with three unknowns given by $\sqrt{2z}=\sqrt{x+\alpha y}+\sqrt{x-\alpha y},(\alpha\neq 0)$ are obtained through the integer solutions of Pythagorean equation.

Keywords: Surd equation, transcendental equation, integer solutions.

1. Introduction

Diophantine equations have an unlimited field of research by reason of their variety. Most of the Diophantine problems studied by the researchers are algebraic equations [1], [2]. It seems that much work has not been done in finding the integer solutions to transcendental equations involving surds. In this context, refer [3]-[18] to the integral solutions of transcendental equations involving surds. This short communication analyses a transcendental equation with three unknowns given by, $\sqrt{2z}=\sqrt{x+\alpha y}+\sqrt{x-\alpha y}$.

Infinitely many non-zero integer triples (x,y,z) satisfying the above equation are obtained through employing the integer solutions to the well-known Pythagorean equation.

2. Method of Analysis

The surd equation to be solved is,

$$\sqrt{2z}=\sqrt{x+\alpha y}+\sqrt{x-\alpha y}\ (\alpha\neq 0) \qquad (1)$$

On squaring both sides of (1), it simplifies to,

$$z=x+\sqrt{x^2-\alpha^2y^2} \qquad (2)$$

To eliminate the square-root on the R.H.S. of (2), take,

$$x^2-\alpha^2y^2=\alpha^2 \qquad (3)$$

which is in the form of the well-known Pythagorean equation,

$$X^2+Y^2=Z^2 \qquad (4)$$

Employing the most cited solutions of (4), observe that (3) is satisfied by,

$$x=a^2r^2+s^2,\ y=2rs \qquad (5)$$
$$\alpha=a^2r^2-s^2,\ r\geq s\geq 0$$

In view of (2), it is seen that,

$$z=2a^2r^2 \qquad (6)$$

Thus, (5) and (6) represent the integer solutions to (1).

A few numerical solutions are presented in Table 1 below.

Table 1
Numerical solutions

a	r	s	x	y	z
1	2	1	5	4	8
2	3	2	40	12	72
3	5	3	234	30	450

It is worth mentioning that, (3) is also satisfied by

$$x=a^2(r^2+s^2),\ y=a(r^2-s^2),\ r\geq s\geq 0 \qquad (7)$$
$$\alpha=2a^2rs$$

From (2), the value of z is given by

$$z=a^2(r+s)^2 \qquad (8)$$

Thus, (7) and (8) satisfy (1).

A few numerical solutions are presented in Table 2 below

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A Search On the Integer Solutions of Cubic Diophantine Equation with Four Unknowns $x^3 - y^3 = 4(w^3 - z^3) + 3(x-y)^3$

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ABSTRACT: The cubic diophantine equation with four unknowns $x^3-y^3=4(w^3-z^3)+3(x-y)^3$ is analyzed for its non-zero distinct integral solutions. Using different choices, integer solutions for the equation under consideration are obtained.

KEYWORDS: Cubic equation with four unknowns; Integral solutions.

Date of Submission: 24-07-2020 Date of Acceptance: 05-08-2020

I. INTRODUCTION

The cubic diophantine equations are rich in variety and offer an unlimited field for research [1,2]. For an extensive review of various problems, one may refer [3-24]. This paper concerns with another interesting cubic diophantine equation with four unknowns given by $x^3-y^3=4(w^3-z^3)+3(x-y)^3$ is analysed for determining its infinitely many non-zero integral solutions.

II. METHOD OF ANALYSIS

The cubic diophantine equation to be solved for its non-zero distinct integral solutions is given by

$$x^3 - y^3 = 4(w^3 - z^3) + 3(x - y)^3 \quad (1)$$

Introducing the linear transformations

$$x=u+v, \quad y=u-v, \quad w=p+v, \quad z=p-v \quad u \neq v \neq p \quad (2)$$

in (1), it changes to

$$u^2 = 5v^2 + 4p^2 \quad (3)$$

We present different methods of solving (3) to get different sets of integer solutions to (1).

METHOD 1:

We can write (3) in the form of ratio as

$$\frac{u+2p}{v} = \frac{5v}{u-2p} = \frac{\alpha}{\beta}, \beta \neq 0$$

The above equation is equivalent to the double equations

$$\beta u - \alpha v + 2\beta p = 0 \quad \text{and}$$

$$\alpha u - 5\beta v - 2\alpha p = 0$$

Applying the method of cross multiplication, we get

$$u = 2\alpha^2 + 10\beta^2, \; p = \alpha^2 - 5\beta^2, \; v = 4\alpha\beta \quad (4)$$

Using (4) in (2), we have

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A STUDY ON SPECIAL HOMOGENEOUS CONE $z^2 = 24x^2 + y^2$

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ABSTRACT

...homogeneous ternary quadratic equation given by $z^2 = 24x^2 + y^2$ is analysed for its non-zero distinct integer ...tions through different methods. Formulation of second order Ramanujan numbers is illustrated. Also, formulae ...generating sequence of integer solutions based on the given solution are presented.

Keywords: Ternary quadratic, Integer solutions, Homogeneous cone.

Introduction

It is well known that the quadratic Diophantine equations with three unknowns (homogeneous or non-homogeneous) are rich in variety [1, 2]. In particular, the ternary quadratic Diophantine equations of the form $z^2 = Dx^2 + y^2$ are analysed for values of D=29,41,43,47, 53, 55, 61, 63, 67in [3-11]. In this communication, yet another interesting homogeneous ternary quadratic Diophantine equation given by $z^2 = 24x^2 + y^2$ is analysed for its non-zero distinct integer solutions through different methods. Also, formulas for generating sequence of integer solutions based on the given solution are presented.

Methods of Analysis

Consider thecone represented by the homogeneous ternary quadratic equation

$$z^2 = 24x^2 + y^2 \quad (1)$$

We present below different methods of solving (1).

Method 1:

(1) is written in the form of ratio as

$$\frac{z+y}{24x} = \frac{x}{z-y} = \frac{\alpha}{\beta}, \quad \beta \neq 0 \quad (2)$$

which is equivalent to the system of double equations

$$24\alpha x - \beta y - \beta z = 0$$

$$\beta x + \alpha y - \alpha z = o$$

Applying the method of cross multiplication, we have

$$x = 2\alpha\beta, \qquad y = 24\alpha^2 - \beta^2, \qquad z = 24\alpha^2 + \beta^2.$$

Note 1:

It is worth to note that (1) may also be represented in the form of ratios as follows:

i) $\frac{z+y}{6x} = \frac{4x}{z-y} = \frac{\alpha}{\beta}, \quad \beta \neq 0.$

ii) $\frac{z+y}{4x} = \frac{6x}{z-y} = \frac{\alpha}{\beta}, \quad \beta \neq 0.$

iii) $\frac{z+y}{12x} = \frac{2x}{z-y} = \frac{\alpha}{\beta}, \quad \beta \neq 0.$

iv) $\frac{z+y}{2x} = \frac{12x}{z-y} = \frac{\alpha}{\beta}, \quad \beta \neq 0.$

v) $\frac{z+y}{8x} = \frac{3x}{z-y} = \frac{\alpha}{\beta}, \quad \beta \neq 0.$

vi) $\frac{z+y}{3x} = \frac{8x}{z-y} = \frac{\alpha}{\beta}, \quad \beta \neq 0.$

Following the procedure as presented above, one obtains different sets of non-zero distinct integer solutions to (1).

Method 2:

Observe that (1) may be represented as the system of double equations as shown in Table 1:

ON FINDING INTEGER SOLUTIONS TO SEXTIC EQUATION WITH THREE UNKNOWNS $x^2+y^2=8z^6$

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ABSTRACT

...paper deals with the problem of finding non-zero distinct integer solutions to the non-homogeneous ternary ...equation given by $x^2+y^2=8z^2$. A few interesting relations between the solutions and special numbers are ...ed.

...words: non-homogeneous sextic, ternary sextic, integer solutions

Notations

$t_{3,n}$ =Triangular number of rank n

P_n^3 =Triangular pyramidal number of rank n

P_n^5 =Pentagonal pyramidal number of rank n

P_n^6 =Hexagonal pyramidal number of rank n

... =Centered Hexagonal pyramidal number ...rank a

... =Centered Dodecagonal pyramidal number of rank a

... =Centered Nonagonal pyramidal number of rank a

... =Centered hexadecogonal number of ...

... =Centered icositetragonal number of ...

Introduction

It is well-known that a diophantine equation is an algebraic equation with integer coefficients involving two or more unknowns such that the only solutions focused are integer solutions. No doubt that diophantine equations are rich in variety [1-4]. There is no universal method available to know whether a diophantine equation has a solution or finding all solutions if it exists. For equations with more than three variables and degree at least three, very little is known. It seems that much work has not been done in solving higher degree diophantine equations. While focusing the attention on solving sextic diophantine equations with variables at least three, the problems illustrated in [5-22] are observed. This paper focuses on finding integer solutions to the sextic equation with three unknowns $x^2+y^2=8z^6$. A few interesting relations between the solutions and special numbers are exhibited.

Method of Analysis

The non-homogeneous Diophantine equation of degree six with three unknowns to be solved in integers is

$$x^2+y^2=8z^6 \quad (1)$$

Different ways of determining non-zero distinct integer solutions to (1) are illustrated below:

Way:1

Introduction of the transformations

$$x=m(m^2+n^2),\ y=n(m^2+n^2) \quad (2)$$

in (1) leads to

$$m^2+n^2=2z^2 \quad (3)$$

Assume

$$z=a^2+b^2 \quad (4)$$

Write 2 on the R.H.S. of (3) as

$$2=(1+i)(1-i) \quad (5)$$

Using (4) & (5) in (3) and employing the method of factorization, define

$$m+in=(1+i)(a+ib)^2$$

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ON THE HOMOGENEOUS CONE $z^2 = 14x^2 + y^2$

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ABSTRACT

The homogeneous ternary quadratic equation given by $z^2 = 14x^2 + y^2$ is analysed for its non-zero distinct integer solutions through different methods. A few interesting properties between the solutions are presented. Also, formulae for generating sequence of integer solutions based on the given solution are presented.

Keywords: Ternary quadratic, Integer solutions, Homogeneous cone.

Notation

$t_{m,n} = n\left[1 + \frac{(n-1)(m-2)}{2}\right]$

Introduction

It is well known that the quadratic Diophantine equations with three unknowns (homogeneous and non-homogeneous) are rich in variety [1, 2]. In particular, the ternary quadratic Diophantine equations of the form $z^2 = Dx^2 + y^2$ are analysed for values of D=29,41,43,47, 53, 55, 56, 65, 67 in [3-11]. In this communication, yet another interesting homogeneous ternary quadratic diophantine equation given by $z^2 = 14x^2 + y^2$ is analysed for its non-zero distinct integer solutions through different methods. A few interesting properties between the solutions are presented. Also, formulas for generating sequence of integer solutions based on the given solution are presented.

Methods of Analysis

The ternary quadratic equation to be solved for its integer solutions is

$z^2 = 14x^2 + y^2$ (1)

We present below different methods of solving (1).

Method: 1

(1) is written in the form of ratio as

$\frac{z+y}{14x} = \frac{x}{z-y} = \frac{\alpha}{\beta}, \beta \neq 0$ (2)

which is equivalent to the system of double equations

$$14\alpha x - \beta y - \beta z = 0$$
$$\beta x + \alpha y - \alpha z = 0$$

Applying the method of cross-multiplication to the above system of equations,

$$x = x(\alpha, \beta) = 2\alpha\beta$$
$$y = y(\alpha, \beta) = 14\alpha^2 - \beta^2$$
$$z = z(\alpha, \beta) = 14\alpha^2 + \beta^2$$

which satisfy (1)

Properties

- $z(\alpha,1) - t_{30,\alpha} \equiv 1 \pmod{13}$
- $z(\alpha,\beta) + y(\alpha,\beta) - 14x(\alpha,1) + \alpha = t_{58,\alpha}$
- $z(\alpha,\beta) + y(\alpha,\beta) - t_{26,\alpha} - t_{34,\alpha} \equiv 0 \pmod{26}$

Note: 1

It is observed that (1) may also be represented in the form of ratio as below:

(i) $\frac{z+y}{2x} = \frac{7x}{z-y} = \frac{\alpha}{\beta}, \beta \neq 0$

The corresponding solutions to (1) are given as:

$x = 2\alpha\beta,\ y = 2\alpha^2 - 7\beta^2,\ z = 2\alpha^2 + 7\beta^2$

(ii) $\frac{z+y}{7x} = \frac{2x}{z-y} = \frac{\alpha}{\beta}, \beta \neq 0$

ON NON-HOMOGENEOUS QUINTIC EQUATION WITH FIVE UNKNOWNS $3(x^4 - y^4) = 4(z^2 - w^2)T^3$

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ABSTRACT

The process of obtaining non-zero distinct integer solutions to the non-homogeneous quintic equation with five unknowns given by $3(x^4 - y^4) = 4(z^2 - w^2)T^3$ *is illustrated.*

Keywords: non-homogeneous quintic, quintic with five unknowns, integer solutions

Introduction

The theory of Diophantine equations offers a rich variety of fascinating problems [1-4]. Particularly, in [5-8] quintic equations with five unknowns are studied for their integral solutions. In [9,10] quintic equations with four unknowns for their non-zero integer solutions are analyzed. [11-15] analyze quintic equations with five unknowns for their non-zero integer solutions. This communication concerns with yet another interesting non-homogeneous quintic equation with five unknowns given by $3(x^4 - y^4) = 4(z^2 - w^2)T^3$ for finding its infinitely many non-zero distinct integer solutions.

Method of analysis

The non-homogeneous quintic equation with five unknowns to be solved is

$$3(x^4 - y^4) = 4(z^2 - w^2)T^3 \quad (1)$$

Different ways of solving (1) for its integer solutions are presented below:

Way: 1

Introduction of the linear transformations

$$x = 2p, y = 2q, z = 4p + 2q, w = 2p + 4q \quad (2)$$

in (1) leads to

$$p^2 + q^2 = T^3 \quad (3)$$

which is satisfied by

$$p = m(m^2 + n^2), q = n(m^2 + n^2) \quad (4)$$

$$T = m^2 + n^2 \quad (5)$$

Using (4) in (2), one has

$$\left.\begin{array}{l} x = 2m(m^2 + n^2), y = 2n(m^2 + n^2) \\ , z = 2(2m + n)(m^2 + n^2), w = 2(m + 2n)(m^2 + n^2), \end{array}\right\} \quad (6)$$

Thus, (5) and (6) represent the integer solutions to (1).

Note: 1

It is worth to note that (3) is also satisfied by

$$p = m^3 - 3mn^2, q = 3m^2 n - n^3, T = m^2 + n^2$$

In this case, the corresponding integer solutions to (1) are given by

$$x = 2(m^3 - 3mn^2), y = 2(3m^2 n - n^3), z = 4(m^3 - 3mn^2) + 2(3m^2 n - n^3),$$
$$w = 2(m^3 - 3mn^2) + 4(3m^2 n - n^3), T = m^2 + n^2$$

Way: 2

Introduction of the linear transformations

$$x = u + v, \ y = u - v, z = 3u + v, w = 3u - v \quad (7)$$

In (1) leads to

$$u^2 + v^2 = 2T^3 \quad (8)$$

Solving (8) through different methods and using (7), one obtains different sets of integer solutions to (1) which are illustrated as follows:

Set: 1

Let $T = a^2 + b^2$ (9)

Write 2 as

$$2 = (1 + i)(1 - i) \quad (10)$$

Using (9) and (10) in (8) and employing the method of factorization, define

$$u + iv = (1 + i)(a + ib)^3$$

Equating real and imaginary parts, we get

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A STUDY ON THE PELL –LIKE EQUATION $3x^2 - 8y^2 = -20$

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ABSTRACT

...hyperbola represented by the binary quadratic equation $3x^2 - 8y^2 = -20$ is analyzed for finding its non-zero ...integer solutions. A few interesting relations among its solutions are presented. Also, knowing an integral ...of the given hyperbola, integer solutions for other choices of hyperbolas and parabolas are presented. The ...ation of second order Ramanujan Numbers with base numbers as real integers and Gaussian integers is ...and also the sequence of Diophantine 3-tuples are exhibited.

...words: Pell like equation, Binary quadratic, Hyperbola, Parabola, 2nd order Ramanujan numbers, ...ence of Diophantine 3-tuples.

Introduction

The binary quadratic Diophantine equations of the form $ax^2 - by^2 = N, (a, b, N \neq 0)$ are rich in variety and have been analyzed by many mathematicians for their respective integer solutions for particular values of a, b and N. In this context, one may refer [1-11].

This communication concerns with the problem of obtaining non-zero distinct integer solutions to the binary quadratic equation given by $3x^2 - 8y^2 = -20$ representing hyperbola. A few interesting relations among its solutions are presented. Knowing an integral solution of the given hyperbola, integer solutions for other choices of hyperbolas and parabolas are presented. The formulation of second order Ramanujan Numbers with base numbers as real integers and Gaussian integers is illustrated and also the sequence of Diophantine 3-tiples are presented.

Method of Analysis

The hyperbola represented by the non-homogeneous quadratic equation under consideration is $3x^2 - 8y^2 = -20$ (1)

Introduction of the linear transformations

$x = X + 8T, y = X + 3T$ (2)

in (1) leads to

$X^2 = 24T^2 + 4$ (3)

The smallest positive integer solution for (3) is $T_0 = 2, X_0 = 10$

To find the other solutions to (3),consider the corresponding pell equation given by

$X^2 = 24T^2 + 1$ (4)

whose general solution $(\widetilde{T_n}, \widetilde{X_n})$ is

$$\widetilde{X_n} = \frac{1}{2} f_n$$

$$\widetilde{T_n} = \frac{1}{2\sqrt{24}} g_n$$

Where

$$f_n = \left(5 + 1\sqrt{24}\right)^{n+1} + \left(5 - 1\sqrt{24}\right)^{n+1}$$

$$g_n = \left(5 + 1\sqrt{24}\right)^{n+1} - \left(5 - 1\sqrt{24}\right)^{n+1}$$

- Employing the lemma of Brahmagupta between the solutions (T_0, X_0) & $(\widetilde{T_n}, \widetilde{X_n})$,the general solution (T_{n+1}, X_{n+1}) to (3) is given by

$$T_{n+1} = T_0\widetilde{X_n} + X_0\widetilde{T_n}$$
$$= f_n + 5 * \frac{1}{\sqrt{24}} g_n$$

$$X_{n+1} = X_0\widetilde{X_n} + DT_0\widetilde{T_n}$$
$$= 5f_n + 24 * \frac{1}{\sqrt{24}} g_n$$

where n=-1,0,1,......

In view of (2),the general solution (x_{n+1}, y_{n+1}) to (1) is given by

$$x_{n+1} = X_{n+1} + 8T_{n+1}$$

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Stochastic Modeling for Using an Extended Reliability Growth Model for Survival Outcomes in Black And White Breast Cancer Patients

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ABSTRACT: To evaluate weight change patterns over time following the diagnosis of breast cancer and to examine the association of post-diagnosis weight change and survival outcomes in Black and White Patients. BMI loss is a strong predictor of worse breast cancer outcomes, growing prevalence of obesity may hide diagnosis of cancer cachexia, which can occur in a large proportion of breast cancer patients long before death. The most widely used traditional reliability growth tracking model and reliability growth projection model are been included as International Standard and National Standard models. These traditional models address reliability growth based on failure modes surfaced during the test. This paper presents an Extended Model that addresses this practical situation and allows for primitive corrective actions.

Key words: Breast Cancer, Stress Management, Stress, Body Mass index(BMI), Extended reliability growth model.

I. INTRODUCTION

Obesity is a common health problem in the USA with its prevalence increasing in the past few decades [1]. Obesity is associated with not only an increased risk of many cancers [2], including postmenopausal breast cancer, but may also impact cancer prognosis and treatment [3]. Body size before or at diagnosis and survival has been studied extensively. A Recent meta-analysis reported that for a 5 kg/m^2 increase in body mass index (BMI) before diagnosis. However, relatively few studies have investigated the relationship between weight change after diagnosis and survival outcomes in breast cancer patients, with heterogeneous results [4,5]. Several studies found an association of weight loss with increased risk of mortality. While some studies found and association of weight gain with increased risk of mortality, other studies did not find an association between weight gain and survival.

In the test-fix-test strategy problem modes are found during testing and corrective actions for these problems are incorporated during the test. For the test-find-test strategy problem modes are found during testing but all corrective actions for these problems are delayed and incorporated after the completion of test. This paper presents an extended reliability growth model that provides assessments for the test-fix-find-test strategy and also allows for preemptive corrective actions. The Extended Model preserves the properties of the traditional models and reduces to backgroundthese models and strategies as special cases. The model also provides extensive metrics useful for managing the reliability program.

II. BACKGROUND ON THE WIDELY USED TEST-FIX-TEST MODEL

Tolay the groundwork for the Extended Model we first give some background on the two widely used basic models. For reliability growth during test-fix-test development testing states that the instantaneous system MTBF at cumulative test time t is

$$M(t) = [\lambda\beta t^{\beta-1}]^{-1} \quad (1)$$

where $0 < \lambda$ and $0 < \beta$ are parameters. The Non- homogeneous Poisson Process with intensity in [9] is defined by

$$r(t) = \lambda\beta t^{\beta-1} \quad (2)$$

thus allowing for statistical procedures based on this process for reliability growth analyses. This model is applicable to text-fix-test data not test-fix-find-test. Estimation procedures, confidence

...VATION ON THE NON-HOMOGENEOUS BIQUADRATIC EQUATION WITH FIVE UNKNOWNS $(x^4 - y^4) = 10(z + w)p^2$

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ABSTRACT

...se of this paper is to obtain the non-zero distinct integral solutions of quinary bi-quadratic non-...us Diophantine equation $(x^4 - y^4) = 10(z + w)p^2$. In this paper, we present some different patterns of ...lutions to the above bi-quadratic diophantine equation in five variables

...rds: Quinary bi-quadratic equations, Non-homogeneous diophantine equation, Integer solutions

Introduction

...y Number Theory and Mathematics, to ...utions of equations in integers is one of ...dest and significant mathematical ...n since the second millennium B.C. ...e Babylonians who managed to find ...s of the equations systems with two ...wns. Different types of equations and ...s were started to extend by Diophantus ...rd century A.D. Since then, many ...maticians have been working on the ...ent types of Diophantine equations. ...ing on non-linear Diophantine equations ...rees higher than two worthy of notice ...ss was acquired just in the 20th century. ...iterature, there are lot of specific type of ...antine equations with high degree as ...problem. Gopalan and his co-authors ([2]-[9] and [11]-[19]) considered a lot of ...ent types of homogeneous bi-quadratic ...ntine equations with five variables and ...ed non-zero different sets of the ...ons for such equations. One may read [1] ...] books if their interest is in Pythagorean ...es and Nasty numbers as well as their ...erizations. Besides, the Gopalan's book ...is useful and include a number of ...cant results on higher degree diophantine ...ons for readers.

...s paper, we consider one of the such non-...high degree diophantine equations as $(x^4 - y^4) = 10(z+w)p^2$ and try to find the ...ent sets of integer solutions to this ...antine equation by using elementary ...braic methods. The outstanding results in this study of diophantine equation will be useful for all readers.

Method of Analysis

The Diophantine equation representing the non-homogeneous biquadratic equation with five unknowns under consideration is

$$(x^4 - y^4) = 10(z + w)p^2 \quad (1)$$

Introducing the transformations

$$x = u + v, y = u - v, z = 2vu + 1, w = 2vu - 1, u \neq v \neq 0 \quad (2)$$

in (1), it simplifies to

$$u^2 + v^2 = 5p^2 \quad (3)$$

The above equation (3) is solved through different ways and thus, one obtains distinct patterns of integer solutions to (1).

Way-1

Let $p = a^2 + b^2$ (4)

Write 5 as

$$5 = (2 + i)(2 - i) \quad (5)$$

Using (4) & (5) in (3) and employing the method of factorization, define

$$u + iv = (2 + i)(a + ib)^2 \quad (6)$$

Equating the real and imaginary parts of (6), we get

$$u = 2a^2 - 2b^2 - 2ab \quad (7)$$
$$v = a^2 - b^2 + 4ab$$

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A Study On The Hyperbola $y^2 = 11x^2 + 1$

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Abstract

The binary quadratic equation $y^2 = 11x^2 + 1$ is considered and a few interesting properties among the solutions are presented. Employing the integral solutions of the equation under consideration, a few remarkable observations are illustrated.

Keywords: Binary quadratic, hyperbola, integral solutions, pell equation.

Introduction

Any non-homogeneous binary quadratic equation of the form $y^2 - Dx^2 = 1$ where D is a given positive non-square integer, requiring integer solutions for x and y is called Pellian equation (also known pell-Fermat equation). In cartesian co-ordinates, the equation has the form of a hyperbola. The pellian equation has infinitely many distinct integer solutions as long as D is not a perfect square and the solutions are easily generated recursively from a single fundamental solution, namely, the solution with x, y positive integers of smallest possible size. One may refer [1-9] for a few choices of Pellian equations along with their corresponding integer solutions.

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FORMULATION OF PYTHAGOREAN TRIANGLE WITH PROPERTY λ(Hypotenuse * Perimeter - 4 * Area) = Perimeter * Square integer

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ABSTRACT

...is made to obtain Pythagorean triangle with property λ(Hypotenuse*Perimeter-4*Area) is ...a square multiple of perimeter. A few numerical examples are presented.

...: Pell equation, integer solutions, Pythagorean triangle 2010 M.SC classification number: 11D09

Introduction

...fascinating branch of mathematics is the ...of numbers where in Pythagorean ...s have been a matter of interest to ...s mathematicians and to the lovers of ...ics, because it is a treasure house in ...the search for many hidden connection ...treasure hunt.

...Pythagorean numbers play a significant ...in the theory of higher arithmetic as they ...in the majority of indeterminate ...has had a marvelous effect on a ...s people and always occupy a ...table position due to unquestioned ...ical importance. The method of obtaining ...non-zero integers x,y and H under certain ...s satisfying the relation $x^2+y^2=H^2$ ...been a matter of interest to various ...ematicians [1]-[4]. In [5]-[13], special ...gorean problems are studied. In this ...ication, we search for different ...s of Pythagorean triangles with the ...erty ...(Hypotenuse*Perimeter-4*Area) is ...to a square multiple of perimeter.

Method of Analysis

...ting the legs of Pythagorean triangle by x, y ...and the Hypotenuse by H, the most cited ...of the Pythagorean equation are $x^2+y^2=H^2$ given by

$x=u^2-v^2, y=2uv, H=u^2+v^2, u>v>0$ (1)

Denoting the area and the perimeter of the above Pythagorean triangle by A and P, one has

$A=uv(u^2-v^2), P=2u(u+v)$ (2)

Now, the problem is to find u and v such that

$\lambda(H*P-4A)=\text{Square Multiple of } P=\mu^2 P$ (3)

where λ is any non-zero positive integer and μ is an unknown integer. Substituting the above values of H, P and A in (3), it simplifies to the equation

$\mu^2=2\lambda v^2+\lambda(u-v)^2$ (4)

Since $u>v>0$, Consider

$u=v+k,(k>0)$ (5)

Using (5) in (4), it is written as

$\mu^2=2\lambda(u-k)^2+\lambda k^2$ (6)

Choose λ such that 2λ is a square –free integer.

In this case, (6) represents the positive Pell equation. Solving (6), the values of u are obtained and in view of (5), the corresponding values of v are found. Knowing the values of u and v, the legs and hypotenuse of the Pythagorean triangle are obtained from (1).

Illustration : 1

Assume that $X=u-k$ (7)

Let $\lambda=1$ (8)

Substituting (8) and (7) in (6), one obtains

$\mu^2=2X^2+k^2$ (9)

whose initial solution is $X_0=2k, \mu_0=3k$ (10)

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Observations on $2y^2 + xy = z^2$

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Abstract

Formulae for generating sequences of integer solutions based on the given solution to the ternary homogeneous quadratic Diophantine equation given by $2y^2 + xy = z^2$ are exhibited.

Keywords: homogeneous equation, ternary quadratic, generation of solutions

Introduction

The subject of diophantine equations is one of the significant areas in number theory and occupies a remarkable position in history due to its unquestioned historical importance .The purpose of any diophantine equation is to solve for all the unknowns in the problem. It is quite obvious that diophantine equations are rich in variety and there are methods available to obtain solutions either in integers or in Gaussian integers.

The natural question that arises now is ,whether a general formula for generating sequence of solutions based on the given solution can be obtained? While searching for problems on quadratic diophantine equations, the authors came across the book [1] entitled "CONSTRUCTION OF GENERATION FORMULA OF SEQUENCE OF INTEGER SOLUTIONS TO SPECIAL HOMOGENEOUS CONES". The results presented in the above book motivated us for obtaining sequences of integer solutions based on the given solution to the ternary homogeneous quadratic diophantine equation given by $2y^2 + xy = z^2$.

Method of analysis:

The homogeneous quadratic equation with three unknowns under consideration is

$$2y^2 + xy = z^2 \qquad (1)$$

After performing a few algebra ,(1) is satisfied by the following triples:

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IMPACT OF COVID 19 ON CASHLESS TRANSACTION IN INDIA

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ABSTRACT

An analysis had been made to study the impact of COVID -19 on cashless transaction in India. Over the years, our world is facing number of pandemic diseases and the pandemic results in number of downfall across the world. To prevent the spread of COVID19, the practice of social distancing is followed. Due to social distancing number of social activities had been reduced, which in turn affects the economy. This research paper is trying to analyze the impact of Covid -19 on digital payments in Indian Economy.

Keyword: Covid -19, Cashless Transaction, IMPS, NEFT, RTGS, Credit Card, Debit Card

INTRODUCTION:

"Prevention is better than Cure" is a situation which our mother earth is facing today. Our mother earth is affected by a pandemic disease in March 2019. Pandemic disease means an infectious disease that had been spread in multiple continents. There are number of pandemic diseases that had been faced by the world in the past like Cholera, Bubonic Plague, Smallpox, Influenza, Spanish Flu, Ebola, H1N1 and now COVID – 19.

"Corona Virus Disease of 2019" is abbreviated as COVID -19.The disease had been originated in Wuhan –China in December 2019.It is highly infectious and communicable disease which belong to SARS COVID -19 family. In India, the first Covid case was reported in January 30th 2020 in Kerala. The disease took a start in March 2020.The WHO declared COVID -19 as pandemic in March 2020.

Since COVID – 19 is a communicable disease, the Government of India had imposed lockdown from 17th March 2020. Due to this the movement of people from one place to other

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FORECASTING THE RELATIONSHIP BETWEEN GOLD PRICE AND DOMESTIC INFLATION IN INDIA

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ABSTRACT:

This study examines the role of Gold price against inflation rate in India. There are many factors that are influencing the Gold price. This article restricted to focus on Inflation rate alone. GDP, wages and more importantly prices are affected by inflation which is an important macroeconomic indicator in the economy. The research analysis reveals the association between inflation and Gold in India. Data sets of the period from April 2009 to March 2019 used for the study. Statistical tool used to analyze the study are correlation and regression. The results indicate that in the long run the impact of Inflation rate on Gold is not significant.

Keyword: *Inflation, Gold, Macroeconomic, Market Condition, Investment*

INTRODUCTION:

The commodity market is one of the prevailing markets in the upcoming Indian economy. Commodity markets are categorized into four sectors. Bullion, Base metal, Energy and Agri based commodities. Bullion market contributes to the economic development of the country. Gold is the oldest precious metal which occupies major share in Bullion market. Gold is not only known as a metal but also valued as a global currency, a commodity, an investment and as an ornament. In term of investment, gold is typically viewed as a financial asset that maintains its value and purchasing power during inflationary periods.

The Influence of 'Pester Power' on Family Buying Behaviour

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ABSTRACT:

This study was conducted to measure the influence of pester power of the children on the family buying behaviour and the effect of them over the parent's decision. The sample size of the study is 200 which include both parents and children. Two different types of questionnaire were prepared, and the data were collected. Convenience sampling method was used to collect the data. It is found that the main reasons for the parents to buy the product demanded by the children are 'quality', 'usage of the product' and their 'usual routine to get products demanded by the children'. The main reasons for not choosing the product are 'No need to buy', 'Affordability' and the 'poor quality'. According to the parents the product categories that are mostly influenced by the children were snacks, toys and fast food. On the other hand, children show more interest on the fast food, consumer durable and snacks. Interestingly, the children don't want their parents to advise them while purchasing and they want them to be included in the buying process.

Keywords: *Pester power, Influence of Children, Family Buying Behaviour, Influential power, Family Decision Making*

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[illegible]ancement of pigments production in the green microalga *Dunaliella* [illegible] (PSBDU05) under optimized culture condition

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[illegible] INFO

ABSTRACT

The present study was aimed to assess the influence of various culture conditions (pH -6, 6.5, 7, 7.5, 8; salinity-18, 23, 27, 32, 37 PSU; temperature-23, 26, 30, 32, 34 °C; photoperiod-12:12, 18:6, 20:4, 6:18, 24:00 h L:D; and light intensity-50, 100, 150, 200, 250 μ mol m^{-2} s^{-1}) on the production of chlorophylls ('a' and 'b'), total carotenoids and β-carotene at laboratory scale. The growth, biomass, and pigments were assessed once in two days for 10 days and the findings revealed that the *D. salina* can grow at any given salinity but the pigments production rate was varied by one to another. The growth, biomass, chlorophylls 'a', 'b', total carotenoids, and β-carotene were found to be increased to 1.72, 5.24, 1.65, 2.04, 2.16, 3.28 folds higher under optimized conditions (pH -7; salinity-27 PSU, temperature-23 °C, photoperiod-12:12 h L:D, and light intensity-200 μ mol m^{-2} s^{-1}) when compared to normal conditions.

[illegible]roduction

[illegible]croalgae represent the lower phylogenetic classes of the plant [illegible] but they contribute significantly to the nutraceuticals and [illegible] industries. It is a fact that our 70% of earth surface has been [illegible] with water, and 85–90% of photosynthesis is contributed by [illegible] especially microalgae inhabiting that environs. The ad[illegible] of microalgae are that they can survive at any habitats and also [illegible] the ability to produce the value added products such as [illegible] feed additives, cosmetics, and other high value industrial [illegible]. The colouring pigments are considered to be an important [illegible] since the colourful appearance readily attract the predators ([illegible] et al., 2011). Also, the biotechnological applications of [illegible] significantly influence the global economy through the [illegible] food, chemicals, and pharmaceuticals with their high value [illegible] ([illegible] et al., 2018). As per the recent data, the bioeconomy partially depends on the microalgae due to their production capacity and adaptation to develop new research applications (Fernandez et al., 2020). The use of artificial/synthetic colouring agent in feeds is harmful to the environs, and they are also expensive ([illegible] et al., 2012).

Of late, the natural colourants are getting much attention due to their zero side effects when compared to the synthetic colourants. The carotenoids constitute one of the key candidates in the group of natural colourants that are found in macroalgae, microalgae, fishes, crustaceans, fungi, and bacteria (Tabozza et al., 2009). In view of the common occurrence and multiple uses, the carotenoids are generally preferred one. Especially, in the areas of anti-aging, anticancer, and anteriosclerosis, the carotenoids are required to be used for efficient results. The algal properties like short life cycle, fast growth, proper carotenogenic pathway, and sufficient storage makes it as a prominent source for the natural carotenoids and pigments (Sathasivam and Ki, 2018). The

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Crystal structure and Hirshfeld surface analysis of 1-methyl-4-(2-methyl-10*H*-benzo[*b*]thieno[2,3-*e*][1,4]diazepin-4-yl)piperazin-1-ium 2,5-dihydroxybenzoate propan-2-ol monosolvate

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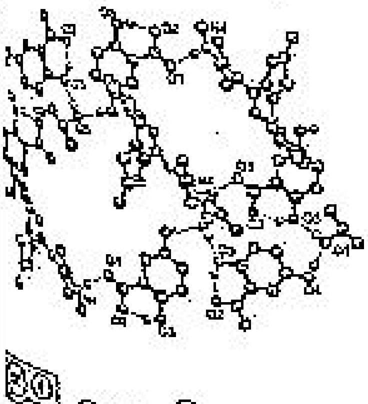
The asymmetric unit of the title salt, $C_{17}H_{21}N_4S^+\cdot C_7H_5O_4^-\cdot C_3H_7OH$, consists of an olanzapinium cation, an independent 2,5-dihydroxybenzoate anion and a solvent isopropyl alcohol molecule. The central seven-membered heterocycle is in a boat conformation, while the piperazine ring displays a distorted chair conformation. The dihedral angle between the benzene and thiene rings flanking the diazepine ring is 52.58 (19)°. In the crystal, the anions and cations are connected by N—H⋯O and O—H⋯O hydrogen bonds, forming a three-dimensional network.

1. Chemical context

Olanzapine is an atypical antipsychotic with indications for the treatment of schizophrenia, acute mania and the prevention of relapse in bipolar disorder. Olanzapine is structurally similar to clozapine, but is classified as a thienobenzodiazepine. Reviews on olanzapine in the management of bipolar disorders (Narasimhan *et al.*, 2007) and olanzapine-associated toxicity and fatality in overdose (Chue & Singer, 2003) have been published. Olanzapine, the pharmaceutically active component of the title compound, a thienobenzodiazepine derivative, along with clozapine, quetiapine, risperidone and ziprasidone, belongs to the newer generation of atypical antipsychotic agents (Chakrabarti *et al.*, 1980; Callaghan *et al.*, 1999; Kennedy *et al.*, 2001; Tandon & Jibson, 2003).

These atypical antipsychotic agents, in comparison with the older generation, show greater efficacy against both positive and negative symptoms of schizophrenia (a debilitating mental disorder) as well as associated cognitive deficits and are virtually devoid of extrapyramidal symptoms (Tandon, 2002). The therapeutic action of olanzapine against the symptoms of schizophrenia is thought to be due to its high affinity for dopaminergic D2 and serotonergic 5-HT2A receptor systems implicated in the pathogenesis of this disease (Bever & Perry, 1998).

The crystal structures of 2-methyl-4-(4-methylpiperazin-1-yl)-10*H*-thieno[2,3-*b*][1,5]benzodiazepine methanol solvate monohydrate (Capuano *et al.*, 2003), polymorphic form II of 2-methyl-4-(4-methyl-1-piperazinyl)-10*H*-thieno[2,3-*b*][1,5]-benzodiazepine (Wawrzycka-Gorczyca *et al.*, 2004*a*), 2-methyl-4-(4-methyl-1-piperazinyl)-10*H*-thieno[2,3-*b*][1,5] benzodi-



IUCrData

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13-Benzyl-4,11-dihydroxy-1,8-diphenyl-2,9-dithia-13-azadispiro[4.1.4.3]tetradecan-6-one

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Keywords: crystal structure; Hirshfeld surface; O—H···O hydrogen bonds; C···H and H···H contacts.

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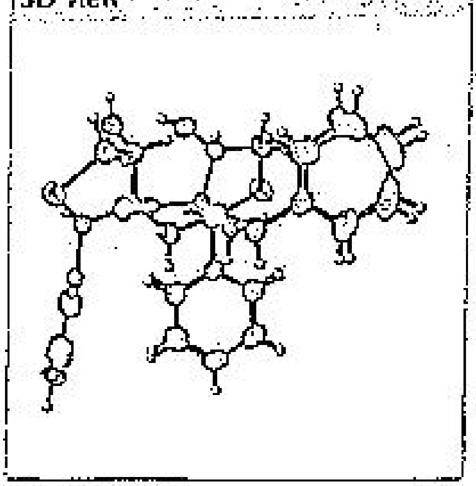
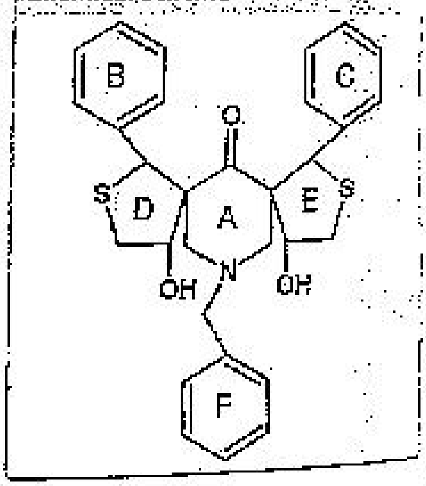
Structural data: full structural data are available from iucrdata.iucr.org

In the title compound, $C_{30}H_{31}NO_3S_2$, the piperidine ring adopts a distorted chair conformation. The thiophene rings have twisted conformations about the C—C bonds. The mean plane of the piperidine ring makes a near orthogonal conformation with the toluene ring. Two of the phenyl rings in the structure are positionally disordered over two sets of sites with occupancies of 0.56 (2)/0.44 (2) and 0.672 (16)/0.328 (16). A region of disordered electron density was corrected for using the SQUEEZE [Spek (2015). *Acta Cryst.* C71, 9–18] routine in *PLATON*. The given chemical formula and other crystal data do not take into account the unknown solvent molecule. In the crystal, O—H···O hydrogen bonds are observed along with intramolecular S···H, O···H, C···H and H···H contacts.

3D view



Chemical scheme



Structure description

Many substituted piperidine derivatives possess a wide range of bioactivities (Pati & Banerjee, 2012). They find significant applications in drug development and their properties depend on the nature of the side groups and their orientations (Viswanathan *et al.*, 2015). As part of our studies in this area, we herein report the crystal structure of the title compound.

The molecular structure of the title compound with atom numbering is shown in Fig. 1. The piperidine ring adopts a distorted chair conformation as observed in a similar related structure, 2 (13-benzyl-4,11-dihydroxy-1,8-bis(4-methylphenyl)-2,9-dithia-13-azadispiro[4.1.47.35]tetradecan-6-one; Viswanathan *et al.*, 2015). However, both the thiophene rings (rings *D* S2/C16/C15/C13/C17 and *E*: S1/C7/C10/C9/C8) have twisted conformations about the C—C bonds (C10—C9 in *D* and C13—C15 in *E*). In 2, ring *D* adopts an envelope conformation and ring *E* a twisted conformation about the C15—C17 bond.

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Influence of Substrate Temperature on Physical Properties of Nebulized Spray Deposited SnSe Thin Films

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Tin-based binary chalcogenide semiconductors SnSe and SnS have created increased interest in the production of earth-abundant and eco-friendly thin film solar cells. Thin films of SnSe were prepared on glass substrates at different temperatures via a nebulized spray pyrolysis technique using Stannous chloride dihydrate and Se powder. Deposited films were characterized by structural, morphological, compositional, optical, and electrical properties. X-ray diffraction studies confirm the films are of polycrystalline orthorhombic crystal structure irrespective of substrate temperature. Scanning electron microscopy studies revealed uniform deposition with nanometer range grain size. Stoichiometric films of SnSe were observed from energy dispersive analysis by X-ray studies. UV–vis spectroscopy confirmed the formation of good adherence thin films with an average transmittance of ~70% in the visible region. Optical band gap was in the range of 1.14–1.24. The lower absorption and high transmittance in the visible region observed at lower substrate temperature represented the good optical quality of the crystals with low absorption or scattering losses. The lower electrical resistivity value of 4.84 Ωcm showed that the films are semiconducting. The structural, optical, morphological, and electrical conductivity studies of tin selenide thin films confirmed that the optimum substrate temperatures for depositing SnSe thin films by this NSP technique is 300°.
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In this scenario, tin-based binary semiconductors such as SnS and SnSe are expected to a play a crucial role in replacing toxicating and compounds and scarced elements based CIGS absorbers in photovoltaic devices. They are relatively earth abundant, non-toxic and easy controllability of stoichiometric. Moreover, the world production of tin, sulphur, and selenium is large (low-price) compared to other absorber elements. These materials exhibit suitable properties such as high chemical stability, suitable band gap (1 eV to 1.5 eV) and high absorption co-efficient (~10^5 cm^{-1}) and p-type conductivity. On the other hand, the solar cells fabricated from SnSe thin films exhibited lower efficiencies (≤1% by non-vacuum methods and >5% by vacuum methods) than CIGS and CZTS solar cells.

In recent past, more importance has been committed in the field of IV–VI class of semiconducting compounds on account of their optoelectronic properties and applications.[1–5] Tin Selenide (SnSe) is a narrow band gap, binary IV–VI semiconductor, suitable for various optoelectronic applications like memory switching devices, photovoltaics, light emitting devices (LED), and holographic recording systems.[6–8] Because of their anisotropic character, the tin chalcogenides are attractive layered compounds, and can be used as cathode materials in lithium intercalation batteries[9] and decreasing the photo corrosion reaction.[10] Considerable attention has been paid by various authors to the preparation of SnSe thin films by different methods like vacuum evaporation,[11–21] flash evaporation,[22] hot wall epitaxy,[23,24] reactive evaporation,[25] electrodeposition,[26–29] chemical solution,[30,31] brush plating,[32] chemical bath deposition,[33] electrochemical atomic layer epitaxy (ECALE)[34] and spray pyrolysis[35,36] to study various physical properties. Among these methods, although high quality and uniform films are prepared by physical technique, they are comparably costly and highly energy consuming. Nebulized spray pyrolysis is a simple, versatile, inexpensive, time saving and efficient way of growing thin films at atmosphere. This technique can be scalable to larger area deposition. The nebulized spray pyrolysis technique (NSP) has been used to deposit binary and ternary oxide thin films such as Al doped zinc oxide,[38] Cd-doped SnO_2,[39] $Cd_xZn_{1-x}O$,[40] doped ZnO,[41] Xiaorong et al.[37] reported that this technique advantages like the simplicity of the apparatus and low price of materials. E. E. Ebenso et al.[42] had reported deposition of a quaternary oxide, $Ln_{1-x}Sr_xCoO_3$ (Ln=La, Nd, and Gd) and ternary oxide, $SrRuO_3$ thin films by nebulized spray pyrolysis technique. It was observed that the film prepared by this technique exhibits low resistivity than other techniques which can be exploited for use as electrodes in several situations. SnSe Thin films were not deposited previously by NSP technique.

In this work, an attempt was made to deposit SnSe thin films by simple nebulized spray pyrolysis technique. The observations of this study reveal that SnSe thin films have good semiconducting nature and seem to be a promising candidate for solar cell applications. The structural, morphological, compositional, optical and electrical properties of the films were investigated and analyzed.

Experimental Technique

The problems associated with solution-based methods can be addressed to some extent by using fabrication technique based on nebulized spray pyrolysis technique of thin films. In the following section, we will discuss in detail of material and methods used for preparing SnSe thin films and the characterizing techniques for analyzing the SnSe thin films.

Materials and methods.—SnSe thin films were deposited on glass substrate by spraying an aqueous solution containing 0.1 M of $SnCl_2$ (Sigma-Aldridge) and Se powder (Himedia) with nebulized spray technique. Substrate cleaning plays an important role in the deposition of thin films. The contamination of the substrate surface may cause nucleation sites facilitating the growth, which results in non-uniform film growth. Hence, the micro glass substrates of dimensions 7.5 × 2.5 × 0.25 cm^3 were first washed well with detergent. The washed glass slides were put in hot chromic acid for 1 h to remove grease or oil. Then, they were rinsed with acetone and double distilled water before the deposition of the films. In this study, different substrate temperatures (T_s) were used for thin film deposition. The air as carrier gas, flow rate was kept at 1 kg cm^{-2} corresponding to an average pressure solution rate of 5 ml per 15 min. The volume of solution was taken as 10 ml per substrate. Films are very shiny and color in bluish gray. All the films were kept on the hot plate until the substrate temperature is reached to room temperature and then preserved them in sealable pockets.

Characterization technique.—The chemical and structural phases of the SnSe films were determined by X-Pert Pro X-ray

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Management

TRENDS OF HUMAN RESOURCE PRACTICES IN CORPORATE HOSPITALS

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ABSTRACT

The scope of human resource management is very wide. It is concerned with organizing human resources in such a way as to get the maximum output to the enterprise and to develop the talent of the people at work to the fullest individual satisfaction. It includes all activities which help the management in getting the work done by the labor force in the organizations. Thus, HRM considers all problems of the people at work, i.e., economic, social, psychological and political (Suri and Chhabra 2001). Private Hospitals today, small or large, are no more charitable institutes but professional organizations rendering medical service to society. They are, in fact, one of the service industries of present times and since a hospital is an industry, Human Resource Management has a significant role to play in its working. Today's private hospitals are run not only by medical people like doctors and nurses but many other paramedical people and non medical people. Effective functioning of a private hospital needs effective human resource management. The universe of the present study includes all the branches of GVN hospitals in urban and west blocks of Tiruchirappalli District. From this sampling frame, the researcher selected 75 employees from each branches of GVN Groups of hospitals by using stratified proportionate random sampling method. They were included 15 Executives, 15 Nurses, 15 Pharmacies, 15 Laboratories and 15Administrators. 1040 employees are working in these hospitals. The sample taken for analysis consisted of 375 employees they were selected from each branch through stratified proportionate random sampling method.

KEYWORDS :

INTRODUCTION:

A large number of professionally and technically skilled people apply their knowledge and skill with the help of complicated equipments and appliances to produce quality care for patients. The excellence of the product the most important factor for a hospital, therefore, depends on how well its human and material resources are applied to promote patient care (Anand, 1999).

The objective to this study is to assess the perception of HR managers about the challenges they face and the current strategies being adopted. The study also aims at assessing enabling factors including role, education, experience and HR training. It enables hospitals to deliver good quality and Safe healthcare. Improving HR management is crucial. There is a need for a cadre of competent HR management who can fully assume these responsibilities and who can continuously improve the status of employees at their organizations. Armstrong (2001) defines HRM as strategic personnel management emphasizing the acquisition, organization and motivation of human resources. Human resource management (HRM) is defined as the productive use of people in achieving the organization's strategic business objectives (Rose, 2009). Mondy (2010) pointed that HRM practices deployed by organizations are staffing i.e. HR planning, recruitment and selection; HR development i.e. training, development and career planning and development; compensation i.e. direct and indirect financial compensation and nonfinancial compensation; safety and health; and employee and labour relations.

Since Hospitals today, small or large, are no more charitable institutes but professional organizations rendering medical service to society. They are, in fact, one of the service industries of present times and since a hospital is an industry, Human Resource Management has got a significant role to play in its working. Today's private hospitals are run not only by medical people like doctors and nurses but many other paramedical people and non medical people. Effective functioning of a private hospital needs effective human resource management.

Research Design

The study describes the existing status of the employees with regard to the above said variables, the present study is descriptive in nature and hence descriptive design has been established. The data collected by administering questionnaires were chosen and analyzed to enable the researcher to make estimates of the precision and generality of the findings. Hence, for this research descriptive design has been adopted.

The universe of the present study includes all the branches of GVN hospitals in urban and west blocks of Tiruchirappalli District. From this sampling frame, the researcher selected 75 employees from each branches of GVN Groups of hospitals by using stratified proportionate random sampling method. They were included 15 Executives, 15 Nurses, 15 Pharmacies, 15 Laboratories and 15Administrators. 1040 employees are working in these hospitals. The sample taken for analysis consisted of 375 employees they were selected from each branch through stratified proportionate random sampling method.

Human resource is an important factor in helping the hospitals industry to be successful. In the hospital organization human resources is in forge front of service sector and cannot be replaced by machine or electronic gadgets e.g. caring of patients. Human Resource Management-HRM is a management function that helps managers, to recruit, select, train and develop member of an organization. Obviously, human resource management is concerned with the people dimension in organization (Suri and Chhabra, 2001). For successful HRM practices, it is necessary that hospitals should be professionally sound. The slogan of quality in totality cannot be translated into meaningful purposes unless the hospital HRM offers world-class services. We consider a hospital as a social institution. The hospital capable of personnel should be made aware of the organizational goals to make sincere efforts to succeed. Besides, the question of survival is a major problem of growth and prosperity (Syeed 2005). Hence, hospitals organizations are social institutions; it is important to give due weightage to public interests. HRM practices help in professionalizing the services in tune with the defined goals and targets.

Armstrong, (1999) Hall and Goodale (1986) said that HRM is a "Process of bringing people and organizations together so that the goals of each are met", with the aim of the "optimal degree of fit among the four components- the environment, organization, Job and individual".

Today's private hospitals are very complex organization. They run not only by medical people but many other paramedical and non-medical peoples. In view point of the utilization of human resource in private hospital organization both efficiently, effectively and productively is one of the important challenges. At present, a private hospital are run by the senior most physician or surgeon known as either doctor or health care officer with the help of his tiny staff. He has no idea about hospital administration and behavioral management science. It is important to note that good doctors may not always be good administrators. He himself is a doctor and he has to look after so many administrative matters. It is difficult for him to attend both kinds of duties efficiently and effectively.

The present study explores the HR practices in hospitals and focuses on four functions i.e. Recruitment, Training and Development, Employee retention, Promotion and Reward system. It further analyzes the satisfaction level of employees which is related to implementation pattern of above mentioned functions. The researcher anticipates that the study may throw light on some of the critical

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"A STUDY ON MENTAL HEALTH PROBLEMS FACED BY BREAST CANCER PATIENT IN HARSHMITHRA HOSPITAL AT TRICHY"

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Trichy.

ABSTRACT

Breast cancer is a disease in which cells in the breast grow out of control. There are different kinds of breast cancer. The kind of breast cancer depends on which cells in the breast turn into cancer. Breast cancer can begin in different parts of the breast. A breast is made up of three main parts lobules are the glands that produce milk. Isabelle Romeo (1990) Learn penalty for some employ of the spoken contraceptives be joint with a reproduction that accounted for together standby and intrastudy unpredictability. The author also explores distinct unpredictability and model a duration-effect family member flanked by the spoken contraceptive utilizes and breast growth. To study about the socio demographic details of the respondents. To study about the depression among breast cancer patients. There is a significant association between the type of family of the respondents and perception towards overall level of awareness about breast cancer. The Universe of the study constitutes Breast cancer patient undertaking treatment in Harshamithra Hospital, woraiyur. The present research work purposive sampling technique is used one day per five or two respondents' were selected from the universe. The patient were undergone treatment from (10.06.2021 - 30.06.2021). The government can provide free counseling to patient's individual and group counseling also.The government can provide free testing methods for needy poor people. Patients who survive a cancer occurring during childhood or young adulthood, treated with radiation are at a very high risk of chronic squealer and secondary tumors. The canvasser needs to learn the breast tumor and in addition psychoanalysis their difficulty. Breast growth is a illness of pre menopausal female as a entire, except it's too moving younger age unpaid to original danger issue of existence method change and additional contact to gentleman complete chemical that have become a fraction of our everyday life.

KEYWORDS: MENTAL HEALTH PROBLEM FACED BY BREAST CANCER.

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