

Criteria 3- Research, Innovations and Extension

3.3- Research Publications and Awards

3.3.1 Number of research papers published per teacher in the Journals notified on UGC care list during the last five years

Sr. No.	Description	Page Number
1	Publications	1-34



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STUDY AND USE OF SFRC IN SQUAT RC SHEAR WALL

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ABSTRACT

Shear walls are the walls provided in structures for the improvement of the seismic resistance of building structures. These generally span right from the bottom of the structure to its top and resist wind or seismic forces along the plane. Strength, stiffness, and ductility are the important parameters in the seismic resistance of any building. Shear walls require a huge reinforcement in boundary element to resist the flexural moment, which creates congestion of reinforcement in boundary element and it causes a problem in placing and proper compaction of concrete in a lower section. Another issue with a shear wall is the formation and propagation of cracks in the critical region during several cycles of repetition of seismic excitation. Though buildings are designed and constructed as shear walled buildings, there are some evidence of the failures of shear walls and also of complete buildings during past strong earthquakes. In view of improvement in the behavior of shear wall, initially, optimum percentage of steel fiber in concrete was investigated which was observed as (1.5%). Steel fiber reinforced concrete (SFRC) with 1.5 percentage steel fibers is tried in the present study to study its effectiveness in shear walls. Percentage increase in load-carrying capacity and deformation capacity was observed as 18.42 % and 35.54 % respectively. A remarkable improvement was also observed in stiffness, energy dissipation, crack pattern of the shear wall using steel fiber concrete (SFRC) for the construction of the shear wall. No significant change was observed in strain behavior.

Keywords: shear wall, SFRC, strength, stiffness, ductility, energy dissipation

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3232

INTRODUCTION

As earthquakes are a common natural disaster occurring all over the world that causes damage or failure of the structure. Earthquakes result in loss of properties and lives so it is important to reduce or eliminate them. The latest earthquake in Chile and New Zealand, India (Killari), and several others are the examples of such an earthquake that affected societies by causing the loss of lives and properties. Shear wall are provided in structures to minimize failure these failures. These are either long or short depending upon their height to length ratio. Long walls generally fail due to flexure whereas short wall fails due to shear. Flexure failure of RC shear wall occurs mainly due to flexural cracks followed

by shear cracks in lower parts and sapling of concrete cover. Shear failure takes place at bottom of the shear wall. These types of failure can be minimized by improving properties of concrete like strength, stiffness, ductility, energy dissipation capacity, etc. This can be achieved by adding steel fibers or any suitable fibers in concrete or using encased profiles in concrete. Most of the researchers reported improvement in the behavior of shear walls with different provisions.

Conventional concrete is having weak seismic capacity due to high brittleness and low tensile strength which results in low crack resistance, low ultimate strength, weak



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Experimental and Numerical Study of Behavior of RC Shear Wall Using Concealed Stiffeners

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ABSTRACT

A reinforced concrete shear wall is a member provided in a structure for resisting horizontal forces arising from wind or earthquakes that act on buildings. According to the aspect ratio (length to width ratio) shear walls are classified into two types: long (slender, $l/b > 2$) shear wall and short (squat, $l/b < 2$) shear wall. After taking every care in the design of buildings as per seismic-resistant criteria of design given in codal provisions, there are still chances of destruction to buildings even though buildings were constructed with shear walls. To address this problem of squat shear wall failure, in the present study, the use of concealed diagonal reinforced concrete stiffeners and diagonal steel tube stiffeners were verified with the help of analysis as well as experiments to see the improvement of shear walls performance. In this present work, the behavior of squat RC solid shear walls with conventional reinforcement, solid shear walls strengthened with inbuilt RC stiffeners and solid shear walls with steel tube stiffeners was studied. Experiments were performed on six shear wall specimens of 1:3 scaled models and the obtained results were validated using finite element analysis. The load-carrying capacity of shear walls with RC stiffeners and steel tube stiffeners as compared to conventionally reinforced shear walls was found to be more by a percentage of 34.21% and 39.47%, respectively. Compared to conventionally reinforced shear walls, the deformation capacity of shear walls with RC stiffeners and steel tube stiffeners was observed to be more by 34.34% and 9.04%, respectively. Similarly, a percentage increase in strain in the order of 162.96% for RC stiffeners and 209.88% for steel tube stiffeners over conventionally reinforced shear walls was observed.

KEYWORDS: Shear wall, Nominal strength, Analysis, Stiffeners, Strain, Deformation.

INTRODUCTION

Earthquake is one of the major naturally occurring calamities worldwide. Shear walls are commonly used to resist earthquake forces in buildings. Generally, they are made of reinforced concrete (RC), but in some cases, they may be constructed from timber, steel or concrete for low or medium height. Although it is true that shear walls effectively resist lateral forces, many shear-walled buildings worldwide have collapsed or have been damaged during strong earthquakes in the recent past. Failure causes loss of lives and properties, which

ultimately affects the economy and society at a large. Losses due to earthquakes cannot be avoided completely, but may be reduced by some preventive design actions. It is not practicable and economical to build a structure that can resist every possible earthquake force, but it is possible to provide some practical solutions that will improve the behavior of shear walls to minimize damage and loss. Concealed stiffeners may provide a better and more economical solution to improve the performance of shear walls rather than increasing their thickness or reinforcement congestion.

Some previous researchers have tried to improve the behavior of shear walls using composites in shear walls, whereas others tried adding steel profiles in their cross-

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SYSTEM VERILOG ASSERTIONS FOR THE AHB PROTOCOL VERIFICATION

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ABSTRACT

Increasing technology is increasing the amount of logic that can be placed in a silicon chip, driving the development of highly integrated SoC designs. The most important factor for an SoC is how well they are interconnected. The SoC uses an on-chip bus architecture. AMBA (Advanced Microcontroller Bus Architecture) is the most widely used on-chip bus introduced by ARM. 85-90% of the on-chip bus used in a SoC is AMBA (Advanced Microcontroller Bus Architecture). In this work, a AMBA AHB bus verification environment is created and verified using System Verilog Assertions. AMBA Protocol (AHB) is verified by performing successful reads and writes for incremental bursts. Simulation of the AHB verification environment is performed using the Questa Simulator tool (from Mentor Graphics).

Keyword: - AMBA ,AHB ,SV,SVA.

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1. INTRODUCTION

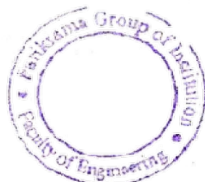
In recent years, due to the increasing market conditions for systems with low power consumption, small footprint, minimal development cost and high performance, as well as the improvement of semiconductor process technology, the demand for Very Large Scale Integration (VLSI) has increased to an extent where all system components need to be integrated on a single chip, called system on chip [2]. These intellectual properties (IPs) with different functions are integrated into one chip, and possibly all these IP modules have completed their design and verification independently. However, there are some scenarios where the individual IPs cause unexpected problems, causing the entire SoC to fail. Incompatibilities between IP interfaces cause common problems with transaction errors. Therefore, it has become a rule for the implementation of a system on chip (SoC) that a standardized and tested bus protocol interface architecture should be integrated. Thus, on-chip communication using a bus protocol whose specification provides a common interface

that facilitates the integration of IPs has become the basis of SoC architecture. In order to promote the reusability of IPs and achieve SoC integration within time, some standards for bus-based communication architecture have been defined in recent years.

While developing this kind of SOC, verification is a very time-consuming and difficult task. From technical research, it is estimated that verification generally takes up 70% of the total time of the project development cycle, compared to the design phase, which takes only 30% of the total time. Therefore, a number of verification engineers are required to verify an on-chip communication protocol and its functional characteristics as well as synchronization between IPs within the SoC using verification IPs with dedicated verification environment. The communication bus protocols used in today's SOC's are basically classified based on their performance, silicon area, and power consumption. Among the three AMBA protocols, the APB bus protocol structure is the simplest to design and requires less power compared to the

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A Study on Glass Fibre as an Additive in Concrete to Increase Compressive Strength

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ABSTRACT

Concrete paver blocks were invented in Holland, in the fifties as replacement of paver bricks which had become scarce due to the post-war building construction boom. These blocks were rectangular in shape and had more or less the same size as the bricks. During fifty year, the block shape has steadily evolved from non-interlocking to partially interlocking to fully interlocking shapes. Consequently, the pavements in which no interlocking blocks are used are designated as "Concrete Block Pavement (CBP)" or non-interlocking CBP, and those in which partially, or fully interlocking blocks are used are designated as "Interlocking Concrete Block Pavement."

Keywords : Conventional Blocks, Compressive Strength, Paver Blocks, coir fibre, Fly Ash.

I. INTRODUCTION

Interlocking Concrete Block has been presented in India in development, 10 years prior, for particular requirement to be specific footpaths and parking areas and so on. Presently Interlocking Concrete Block Pavement is being received broadly in various uses where the traditional development of pavement utilizing hot bituminous blend (for flexible pavement) or cement concrete (for rigid pavement) is not desirable or attractive. The construction industry is revolutionizing in two major ways. The other is the advancement in high-performance construction materials, such as the introduction of high strength concrete. Among these high-performance materials, fibre reinforced concrete (FRC) is gradually gaining acceptance from civil engineers. In recent years, research and development of fibres and matrix

materials and fabrication process related to construction industry have grown rapidly. Their advantages over other construction materials are their high tensile strength to weight ratio, ability to be moulded into various shapes and potential resistance to environmental conditions, resulting in potentially low maintenance cost. These properties make FRC composite a good alternative for innovative construction. The aim of this study was to identify the improvement in strength characteristics of concrete with the addition of coconut fibre. In the study, coconut fibre is added to concrete and Plain Cement Concrete (PCC) is used as reference to study its effect on flexural, compressive and tensile strength properties and also drying shrinkage. Fibre is coated with oil so as to decrease the water absorption. Some of the advantages being observed are low-cost, low density, reasonable specific strength, good thermal



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‘EFFECT OF METAKAOLIN AND BASALT FIBRE ON MECHANICAL PROPERTIES OF CONVENTIONAL CONCRETE’

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ABSTRACT : *Concrete is one of the well-known construction materials. However, the production of Portland cement, an essential constituent of concrete, leads to the release of significant amount of CO₂, a greenhouse gas; one ton of Portland cement clinker production is said to creates approximately one ton of CO₂ and other greenhouse gases . Environmental issues are playing an important role in the sustainable development of the cement and concrete industry. Today many researches are ongoing into the use of Portland cement replacements, using many waste materials like pulverized fly ash (PFA) and ground granulated blast furnace slag (GGBS). Like PFA and GGBS, a metakaolin is also used as a binder with partial replacement of cement which take some part of reaction at the time of hydration, also it is act as a filler material. Cement replacement by metakaolin in the range 5% to 25% increment of 5% is to be study in addition with basalt rock fibre by volume fraction in range from 0.05% to 0.25% with increment of 0.05%. It was tested for mechanical properties at the age of 7, 28 days and compared with those of conventional concrete.*

1. INTRODUCTION

Concrete is a blend of cement, sand, coarse aggregate and water. The key factor that adds value to concrete is that it can be designed to withstand harshest environments significant role. Today global warming and environmental

devastation have become manifest harms in recent years, concern about environmental issues, and a changeover from the mass-waste, mass-consumption, mass-production society of the past to a zero-emanation society is now viewed as significant. Due to global warming the need to cut down energy consumption has



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Earthquake Resisting Elements and Techniques in High Rise Buildings



Sanjivan Mahadik, S. R. Bhagat

Abstract: - An earthquake resisting elements are the components that are introduced in a structure to improve its seismic resistance and method of application of these elements are said as techniques. Though structures are designed and detailed as per code provision there remains some possibility of damage or failure in strong earthquake. Performance of buildings may be improved using earthquake resistant elements and techniques. An earthquake produces seismic waves on earth surface of earth due to releases of large energy from lithosphere which produces waves in earth surface causing disturbance in structures resulting failure of seismically weak structures. Seismic waves then travels in horizontal and vertical direction. It causes horizontal and vertical ground movement or vibration. These seismic waves cause disturbances in in buildings. The disturbance caused depends on position of building with respect to the center of disturbance called as epicenter. Intensity of these seismic waves is maximum at center and goes on reducing away from epicenter. Generally horizontal waves are of stronger than vertical so buildings are designed to horizontal seismic forces. These waves travel in any direction but from design purpose it is resolved in two orthogonal directions. Few constructional precautions may help to avoid or minimize damage in buildings. Earthquake resistance of building may be improved with proper design and construction of structures. Some earthquake resisting elements like shear wall, moment resisting frame or innovative techniques like base isolation, or energy dissipation system are used in many high rise buildings to avoid or minimize damage and hence loss of lives and properties. Shear walls are RC member generally introduced in a structure during construction in symmetrical manner. Base isolators in the form bearings are placed between sub and super structure to reduce stiffness of structures. Structures are braced with seismic dampers in energy dissipation system. Composites are used by mixing in concrete or as a warp. All these techniques are reviewed herewith with special attention on shear walls.

Keywords: Earthquake resistance, shear wall, base isolation, energy dissipation

I. INTRODUCTION

Seismic resistant building is that building which has designed and constructed as per seismic resistant design and constructed taking all care of avoiding casualties during future possible earthquake.

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Though structures are designed and constructed as per code provision, there are some evidences of failure in past strong earthquake. Strength, stiffness and energy dissipation behaviour are the major areas where improvement can be made to make structures seismic resistant. Several techniques have been developed and also different composite materials are now in use for seismic resistance improvement. This paper gives an insight on seismic behaviour of structure and improvement techniques used for seismic resistance in practice. Behaviour of shear wall having medium height was studied by [1] to know improvement in its seismic performance using different inbuilt bracing maintaining same reinforcement percentage as that of normal reinforced wall and it was observed that there is significant improvement in seismic behaviour of these shear walls using inbuilt bracing without increasing reinforcement.

A study of improvement of behaviour of shear wall with introducing different inbuilt steel sections embedded in concrete was made by [4] and it was investigated that, use of encased profiles in shear wall improves strength, stiffness and ductility if shear wall. Similar experience was for [15] in testing of composite shear wall with encased profile placed in seismic area in numerical analysis of composite shear wall [5] while testing six walls with different encased profiles. Use of steel tube filled with concrete as a embedded columns or truss as a seismic improving arrangement in shear wall was studied by [2] and in this research it was observed that, strength as well as ductility of shear wall increases using that type of arrangement. It also slower the stiffness degradation speed which indicates improved resistance to seismic forces. Study of behaviour of shear walls using light weight concrete with was made by [14]. In this experiment different arrangement of reinforcement was studied and it was found that, placing web reinforcement in diagonal manner improves behaviour of shear wall significantly. This arrangement transfers seismic forces to foundation effectively than normal way of reinforcement. It also reduces the stresses in compression strut in shear wall. Study of behaviour of shear wall adding GFRP in concrete was investigated by [8] in which it was observed that, there is insignificant degradation and reasonable stability of stiffness during reverse cyclic loading. Negligible residual strain and drift within limit was observed using GFRP in shear wall. GFRP concrete experiences god confinement with concrete playing great role in improving ductility of shear walls. FRP shear wall also experiences fewer cracks than reinforced concrete shear wall due to absence of yielding of reinforcement.



Use of Composite Materials in RC Shear Wall

Sanjivan Mahadik, Pravin Gunaware, S. R. Bhagat



Abstract: Shear wall is the structural component provided in midrise and tall buildings to resist earthquake and wind forces. These walls are continuous from foundation to top of buildings. Many times the wall around lift and staircase shaft of a building is designed as a shear wall. Generally these are of reinforced concrete but may be of masonry, wood, steel etc. As these walls have to resist heavy lateral forces these are of heavy sections and have a dense reinforcement at lower part which results substantial amount of closely spaced transverse reinforcement causing reinforcement congestion in boundary element creating problem of construction and placing. Heavy reinforcement and large thickness is required at lower stage and in boundary element of these walls. Displacement capacity of RC structures is generally depends on the deformation capacity of the concrete. If large displacement capacity is to be attained, steel is provided in concrete to enhance concrete behavior, particularly compressive strain capacity. To achieve these goals and maintaining size of cross section in control, heavy reinforcement ratio is required to maintain which creates problem of reinforcement congestion. To overcome this problem of reinforcement congestion a small amount of ductile material like steel fibres may be added to concrete. Many researchers had tried to investigate the behavior of RC shear wall with different composites to improve its performance but very few had tried with concrete with steel fibres. Use of composite materials steel fibers in concrete found beneficial in many structural elements is tried in this research for shear wall. In this paper finite element analysis of shear wall model has been carried out to study and compare the behavior of normal concrete shear wall and steel fiber reinforced concrete shear wall with and without opening using ETABS software to know improvement in behaviour when subjected to lateral load by adding steel fibers in concrete.

Keywords: shear wall, SFRC, strength, stiffness, congestion, seismic forces.

I. INTRODUCTION

Concrete is brittle in nature, it fails after formation and widening of cracks followed by spalling of concrete in critical region. This type of failure can be minimized by improving properties of concrete like strength, stiffness, ductility, energy dissipation capacity etc. by adding some composite material in concrete. Previous researchers had studied behaviour of shear walls using different composite materials, adding steel

sections in concrete along with normal reinforcement or providing different reinforcement arrangement. Behavior of shear wall with encased profiles was studied by [3] and it was found that, there is improvement strength, ductility and energy dissipation capacity. Mechanical properties of SFRC was investigated by [8] and it was observed in their experimental program and analytical assessment that, by addition of 1.5% steel fibers, compressive strength of normal strength concrete increases by 3.65%, Poisson's ratio by 0.18%, modulus of elasticity by 8.3%. Shaking table test conducted on SFRC reinforced housing panel by [2] showed that, SFRC wall panels gives comparable performance as that of conventional reinforced concrete wall panels. Performance of shear wall with GFRP was studied by [5] with experimental programme and observed that, there is negligible residual strain up to 78% ultimate load. Reduction in cracks, adequate drift and better ductility was experienced. Performance of steel fiber in reinforced concrete wall panel was studied by [1] with wall panels testing for compression. It was observed that, addition of fiber increases flexural and ultimate capacity of plain concrete wall panel, also reduction in widening of cracks, improvement in concrete ductility, energy absorption capacity and enhancement in overall durability. Study of improvement in compressive strength and flexural strength of concrete by adding SFRC was made by [4] and it was observed that, there is no much improvement in compressive strength but improvement in peak shear strength was observed. Similar experience was reported by [6] in his experiment on SFRC in concrete saying that, there is minor increase in compressive strength due addition of steel fiber. Suitable proportion suggested was 1% to 1.5%. Mechanical properties of SFRC were studied by [7] and it was observed that, compressive strength of concrete increases up to 15.3% and maximum at 1.5%. The splitting tensile strength and modulus of rupture of the fiber-reinforced concrete improved with increasing the volume fraction, achieving 98.3% and 126.6% improvements, respectively, at 2.0% volume fraction. In this paper behaviour of shear wall to lateral loading is studied by analyzing shear wall with and without opening considering average properties of concrete with 1.5% steel fibers and analyzing it with FEA software ETABS.

II. MATERIAL AND METHODS

In this paper FE analysis of four shear wall models of size 1000 x 1000 x 100 mm, was carried out using FEA software ETABS to study the behaviour of RC shear wall with main focus on load carrying capacity and deformation behaviour. Out of four models, one wall is a plain or solid cross section and another one with central opening of size 400 x 400 mm and both casted with normal concrete. Another two models are similar in specifications with addition of steel fibres in concrete. All models were analysed for lateral load.

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STUDY OF FAILURE AND DEFORMATION CHARACTERISTICS OF SOLID SHEAR WALL WITH DIAGONAL STIFFENERS

Sanjivan Mahadik

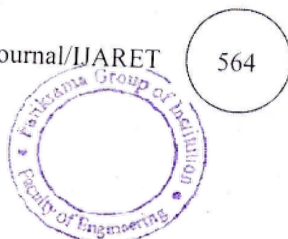
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ABSTRACT

Shear walls are the structural member provided in high rise buildings spanning from foundation to top of the building. These walls serve a dual purpose as seismic and wind resistant element, and as a part of structural enclosure. Sometimes openings are provided in it for the functional requirement or for building services purpose. Strength of these walls reduces due to openings provided in it. To recover this strength reduction, different codes throughout the world have suggested various arrangements of additional reinforcement around openings. As the main function of these walls is to resist seismic forces; these walls act as a barrier at the time of seismic activity. However, the well-designed shear walls may undergo severe damages due to a strong earthquake. Therefore it necessary to strengthen the structures with the help of shear walls without incurring much more cost. Shear walls can be made stronger with the addition of steel area in the form of stiffeners instead of increasing reinforcement ratio. In this study arrangement of concealed stiffeners is proposed to improve the behaviour of solid shear walls. Experiments were conducted on six shear wall models with conventional reinforcement and shear walls with conventional reinforcement along with concealed stiffeners. A significant improvement is recorded with the addition of concealed stiffeners in shear wall cross-section. The main focus of this study is to know deformation capacity, crack pattern, failure mode and strain character in the solid shear wall and improvement in behaviour due to the addition of stiffeners.



STUDY OF FAILURE AND DEFORMATION CHARACTERISTICS OF SHEAR WALL WITH OPENINGS USING CONCEALED STIFFENERS

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ABSTRACT

Shear wall is a structural member provided in multistoried structure for resisting wind and seismic forces acting in the horizontal direction along the plane of the wall. Openings are provided in shear wall generally for meeting a functional requirement or for providing building services like ducts for electric wiring. Strength of any structure reduces due to provision of opening and it is equally true for shear wall also. Long walls fail generally by flexure whereas short wall fails by shear. In case of long walls, failure is generally observed in the critical region which is at $1/6^{\text{th}}$ height of the wall on the either sides. However, short walls fail at the bottom due to the crushing of concrete or yielding of reinforcement. Failure along diagonal is also observed in some cases. If openings are provided in a shear wall, failure is observed at corners or along edges of the shear wall. This type of failure is due to the stress concentration around the opening. Strength of shear wall also decreases due to a reduction in concrete area and discontinuity of reinforcement due to opening. Formation of cracks in the early stage of loading leads to failure of shear walls. To avoid this problem of early failure some provisions have to be made to improve the behavior of shear wall with an opening. To overcome this problem it is proposed to providing concealed diagonal stiffeners in shear wall along diagonal and periphery of opening. In the present study, six shear wall models with the central opening are tested to know the effect of concealed stiffeners in the shear wall with an opening. A significant improvement was observed in the behaviour of the shear wall with opening using concealed stiffeners. The main focus of this study is to know the deformation capacity, crack pattern, failure mode and strain character.

Key words: Shear wall, stiffeners, openings, strength, and improvement.



Effect of Waste Marble Powder on Compressive Strength of Concrete

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ABSTRACT

This Paper Aims to Study Experimentally, the Effect of Partial Replacement of Cement by Marble Powder and Check the Compressive Strength of Concrete of Concrete by Using M25 Grade of Concrete. Replacing Marble Powder by Varying Percentage (i.e 5%, 10%, 15%, 20%) to the Cement and Checking the Compressive Strength after 14 days and 28 days of Curing, and Optimum Percentage of Replacement of Cement is Found Out.

Keywords : Marble Powder, Compressive Strength.

I. INTRODUCTION

The Construction Industry is One Which Grow very Fastly and Rapidly. And this Growth have Some Bad Impact on Environment and Human health. That's why we required an eco friendly and Economical material. Marble Powder are non Degradable waste material and by using this into concrete the cement cost is Reduces. Strength increases and their will be effective utilization of waste material. Cement is very costlier material in concrete and by Replacing the cement with the Marble Powder. The cost of producing the concrete will be minimized. In this Experiment, we have tested sum of 30 cubes for 14 days and 28 days of curing with the varying percentage of marble Powder and Compare the Result with Conventional Concrete.

II. MARBLE POWDER

India producing large amount of marble in this production process Such as Cutting, Shaping, polishing & edginga large amount of marble is turn into marble powder. This marble powder is non-degradable & having some bad impact on plant &

human health. Hence, utilization of such waste is necessary Marble powder have some similar chemical properties like Cement. Marble powders have whitish in colour.[6]



III. OBJECTIVES

- 1) To study the effect on Compressive strength by replacing cement with marble powder.
- 2) To compare result of normal concrete with marble dust powder concrete.
- 3) For effective utilization of waste marble powder.
- 4) To reduce the cost of cement.
- 5) To reduce cost of concrete by reducing cement content.





Performance Characteristics on CI Engine Using Different Blends of Chicken Fat Oil, Caster Seed, Cotton Seed Oil

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Abstract—The world today is faced with serious global warming and environmental pollution. Besides, fossil fuel will become rare and faces serious shortage in the near future. This has triggered the awareness to find alternative energy as their sustainable energy sources. Biodiesel as a cleaner renewable fuel has been considered as the best substitution for diesel fuel due to it being used in any compression ignition engine without any solidification. The main advantage of using biodiesel are its renewability and better quality of exhaust gas emissions. This report reviews the performance of Castor Seed, Cotton Seed, Chicken Fat, Hybrid Oil biodiesel. These Biodiesels used are not edible hence these are more economical to use. Biodiesel is a liquid biofuel obtained by chemical processes from vegetable oil or animal fats and an alcohol that can be used in diesel engine or blended with diesel oil. Blends with diesel fuel are indicated as "Bx", where "x" is the percentage of biodiesel in the blend. For instance, "B5" indicates a blend with 5% biodiesel and 95% diesel fuel; in consequence, B100 indicates pure biodiesel. In this experiment we study the performance of the CI engine for different blends of biodiesel that blends are B10 & B30. The engine performance is carried out by varying the parameter like compression ratio, engine load, injection pressure and injection timing. The effect of these fuel blends is studied experimentally using 3.5 KW @1500rpm CI engine. By conducting this experiment we calculate various terms like fuel consumption, brake power, brake thermal efficiency etc. By taking result we have to analyze these effect of blending so that comparison can be made with pure diesel and find alternatives for diesel therefore castor oil, cotton oil, sunflower oil base bio diesel can become an alternative fuel in future.

Keywords— Biodiesel, Castor Seed Oil, Cotton Seed Oil, Chicken Fat Oil, Renewable energy, B10, B30 etc.

I. INTRODUCTION AND LITERATURE SURVEY

Fuels derived from renewable biological resources for use in diesel engines are known as biodiesel. Biodiesel is environmentally friendly liquid fuel similar to petrol-diesel in combustion properties. Due to few strategies like, the rising population, and the growing energy demand from the transport sector, bio fuels can be assured of a significant market in India. Since no food producing farmland is required for producing the non-edible bio fuel, it is considered the most politically and morally acceptable choice. Alternative fuel is any material or substance, other than petroleum, which is consumed to provide energy to power an engine. Alternative fuels are bio-diesel, ethanol, chemically stored electricity, hydrogen, methanol, Natural gas, wood and vegetable oil. The increase in industrialization and materialization of the world led to step rise in the demand of petroleum products.

Petroleum based fuels are extracted from earth crust and hence their reserve is limited and are irreplaceable. With our present known reserves and the growing rate of fuel consumption, it is feared that they will be exhausted soon. These finite resources of petroleum are highly concentrated in certain regions of the world and have given rise to frequent disruption and uncertainties in its supply and price as well. The world is currently challenged with global warming and environmental pollution. The major sources of greenhouse gas emissions are fossil fuels (Abebe *et al.*, 2011; Atadashi *et al.*, 2011). Therefore, it is necessary to find alternative energy sources that are renewable, economically feasible and friendly to the environment. In addition, the depletion in petroleum worldwide has also stimulated the search for alternative sources (Minima & Saka, 2006; Atadashi *et al.*, 2011). Biodiesel holds great potential as an alternative fuel. Characterised by the aforementioned properties, it has become the focus of many investigations with respect to the greenhouse gas emission and the environmental crisis. It is a biodegradable and non-toxic fuel and a carbon monoxide emission reducer that can be recycled by photosynthesis. This minimizes the impact of biodiesel combustion on the greenhouse effect (Krawczyk, 1996; Korbitz, 1999; Agarwal & Das, 2001; Minima & Saka, 2006; Brito *et al.*, 2007; Kyong-Hwan *et al.* 2008, Atadashi *et al.*, 2011). Moreover, biodiesel has the advantage of good fuel properties such as good lubricity, better quality exhaust gas emissions, sulphur free, carbon neutral and less emission of carbon dioxide in the atmosphere, a cetane number and cloud point which depend heavily on the feedstock and a high flash point (~150°C) which makes it volatile and easy to handle (Zhang *et al.*, 2003; Morais *et al.*, 2010; Kouzu *et al.*, 2012; Yaakob *et al.*, 2013; Glisic *et al.*, 2014). Nevertheless, the challenges associated with the development of alternative fuels continue to attract intensive investigations (Yagiz *et al.*, 2007; Kotwal *et al.*, 2009). The conventional approach of biodiesel production is transesterification, using oil and alcohol in the presence of a catalyst with glycerol as a by-product of the reaction (Zhang *et al.*, 2003; Demirbas, 2005; Atadashi *et al.*, 2011; Boey *et al.*, 2011). Product quality is dependent on the type and amount of catalyst, type of oil feedstock, alcohol-to-oil ratio, FFA and water content in the oil and operating conditions such as agitation speed and temperature (Clark *et al.*, 2013). Several studies concerning biodiesel production have focused on the



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Effect of Roughness and Glass Cover on Solar Air Heater Performance-A Review

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Abstract— Flat plate solar air heaters are usually applied in space heating and drying processes of agricultural products, herbal medicines, clothing etc. This system occupies an important place among solar thermal systems because of minimal use of materials. A solar air heater has low heat transfer coefficient between absorber plate and the flowing air that results in higher heat losses to the environment which ultimately leads to low thermal efficiency of such thermal systems. In order to improve the heat transfer rate several methods for enhancement of thermal performance have been proposed and investigated by researchers. In the present paper the effect of artificial roughness of various geometries and glass cover on the performance of solar air heaters, investigated and analyzed by different investigators, has been mentioned. Also the results due these roughness and glass covers have been illustrated.

Keywords— Relative roughness pitch, (p/e); Relative roughness height, (e/D); Flow Reynolds number, (Re); Nusselt number, (Nu_s); Collector roughness and flow parameters; Collector performance parameters; Collector thermal efficiency, (η_{th}); Thermo hydraulic efficiency, (η_{therma}).

Nomenclature

B Solar air heater duct height, m

B^{-1} Stanton number roughness parameter; $B^{-1} = G_H - P_r R_M$

C^{-1} Efficiency roughness parameter; $C^{-1} = 2.5 \ln e^+ + 5.5 - R_M$

D Hydraulic diameter of solar air heater duct, m Mass Flow Rate

e Roughness height, m

e/D Relative roughness height

$$e^+ \text{ Roughness Reynolds number} = e/D \sqrt{\frac{f_r}{2}} Re$$

e_{opt}^+ Optimal value of e^+

f Friction factor

G_H Heat transfer roughness function; $G_H = 4.5 (e^+)^{0.28} P_r^{0.57}$

L^{-1} Efficiency parameter; $L^{-1} = C^{-1} - B^{-1}$

P Pitch of roughness element, m

p/e Relative roughness pitch

P_r Prandtl number

P_r Turbulent prandtl number

f_r Friction factor in rouhened collector

\bar{f}_r Average friction factor

Re Reynolds number

R_M Momentum transfer roughness function; $R_M = 0.95 (p/e)^{0.53}$

f_s Friction factor in smooth collector

S_i Stanton number

\bar{S}_i Average stanton number

\bar{S}_r Average stanton number

W Width of solar air heater

u Velocity, m/s

u^+ Dimensionless velocity; $u/\sqrt{\tau_0/\rho}$

y Distance from the wall, m

y^+ Dimensionless distance; $(y/\nu)\sqrt{\tau_0/\rho}$

δ' Transition sub-layer thickness, m

δ'' Laminar sub-layer thickness, m

I. INTRODUCTION

Throughout the history of the human race, major developments have been accompanied by an increased consumption of energy. The degree of industrial advancement and prosperity of a nation is directly related to the per capita energy consumption of its people. More industrially developed countries consume more energy than developing and undeveloped countries. Those countries that have had abundant supply of energy available to them have substantially high rate of industrial growth and a corresponding high gross national product (GNP). The developing and developed countries have now to generate and harness more energy for their industrial growth and should be aware of conversion, conservation and development of new energy sources. Primitive man required energy primarily in the form of food. He derived this energy by eating plants products and animals which he hunted. Subsequently he discovered fire and his energy demand increased as he started to make use of wood and other biomass to supply the energy needs for cooking as well as for keeping himself warm, with the passage of time, man started to cultivate land for agriculture. He added a new dimension to the use of energy by domesticating and training animals to work for him, with the increasing demand of energy, man began to use the wind sailing ships and for driving wind mills and stream of water to run water wheels. The other time, the sun was supplying all the energy needs of

Effect of Various Artificial Roughnesses on Solar Air Heater Performance

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Abstract—Many researchers have been conducting various experiments to improve heat transfer rate for solar air heater. Heat transfer rate can be increased by providing various artificial roughnesses to collector plate. By providing the various types of roughness like dimple, v shaped rib roughness on absorber plate inclined as well as the transverse rib on absorber plate. By using heat transfer coefficient the roughness number is find out and to decide that the actual now many heat transfer rate is increase. In this paper a review of different heat transfer enhancement techniques have been summarized.

Keywords— Nusselt number, Inclined and transverse ribs, V shaped rib, Roughness, Solar air heater, Friction factor, Efficiency.

NOMENCLATURE

Nu- Nusselt number of smooth duct (Dimensionless)
P- Pitch (m)
h- heat transfer coefficient($Wm^{-2}k^{-1}$)
Pr- Prandtl number (Dimensionless)
Re- Reynolds number (Dimensionless)
Cd- Coefficient discharge of orifice meter
f- friction factor (Dimensionless)
k- thermal conductivity
m- mass flow rate (Kgs^{-1})
Nu- Nusselt number of roughness duct
Ac- Area of absorber plate (m^2)
Cp- Specific heat of air ($JKg^{-1}K^{-1}$)
V- Velocity of duct (ms^{-1})
W- Width of duct (m)
SE- Stanton number
e- Height of roughness element (m)
L- Length of collector (m)
Greek Symbol:
 ΔP - Pressure drop in test length (pa)
 ρ - Density of air (Kgm^{-3})
 α - Angle of attack of flow

I. INTRODUCTION

History of human, major development has been to increased to consumption of energy. The rapidly increasing the industrialization used more energy. The non-conventional energy is better option for the conversional source like solar, wind, etc.

Some investigations are investigated heat transfer rate in smooth and roughened the many useful information is available in today. For the flowing air the artificial roughness is better option for increasing the heat transfer rate. For

purpose of the artificial roughness the wires, rib, dimple are used. The major component to utilized solar energy is solar air heater. It has several application in space heating and other area normally the rate of heat transfer is low in flat plate cause of low heat transfer coefficient between absorber plate and the following air for the thermal performance several method is used like us of fines packed bed is duct.

In recent work the many investigator investigate various type of geometry for artificial roughness. The recently the three side artificially roughness solar air heater is invalidated to enhance heat transfer rate also the booster mirror also used in one side to increased heat transfer. The roughness is provided for the purpose of the created.

A. Effect of the Combination of Incline and Transverse Ribs on the Solar Air Heater

Varuna, R.P. Sainib, S.K. Singalb,

Perform the experiment on the thermal performance of the solar air heater having roughness element of the combination the inclined and transverse rib on absorber plate

For the different roughness and operating parameter has been evaluated to represent the performance of the solar air heater is as shown in fig .the smooth collector performance also has been shown The three line are also drawn for three value of p/e and one for the smooth absorber plate .obtained result also shown rough collector with absorber plate having relative roughness pitch p/e of give best performance

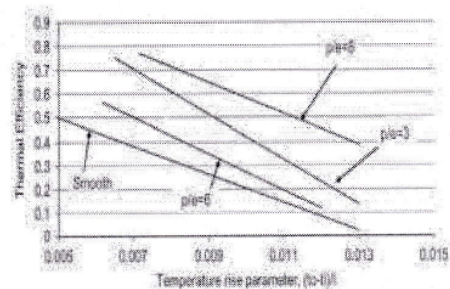


Fig. 1. Effect of the relative roughness pith on the thermal performance

The experimental value for the thermal efficiency for the roughened duct are represent as



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IOT based Vehicle Tracking & Vehicular Emergency System- A Case Study and Review

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ABSTRACT: In this article we have discussed and analyse Internet of Things (IOT) based vehicle tracking and vehicular emergency system which consists basic blocks and algorithms used in proposed system. The article explains the modelling and working of different units of the system such that vehicle and ambulance unit, the traffic unit and server unit. In this article we have also discussed the basic components and their functions such that IOT and their different layers, microcontroller(ATMEGA 16A) and its architecture, accelerometer sensor (ADXL 355) and its pin diagram, RFID reader and its working, GSM and GPS systems and LCD display and its interfacing with microcontroller.

KEYWORDS: IOT, Vehicle tracking system, ATMEGA 16A, ADXL 355, RFID Reader, GSM, GPS

INTRODUCTION

The Internet of Things (IOT) is an arrangement of interrelated computing gadgets, mechanical and digital machines, objects, animals or individuals that are given one kind of an identifiers and the capacity to exchange information over a system without requiring human-to-human or human-to-PC communication. IOT is a new concept that has evolved from the convergence of wireless technologies. Wireless communication is the transfer of information or signal between two or more points that are not connected by an electrical conductor. In IOT devices equipped with Wi-Fi allow the machine-to-machine communication. Using this from of industrial machines to wearable or wireless devices, using built-in sensors to gather data and take action on that data across a network. The sensor and actuator can be setup in different place but they are working together over an internet network. Using IOT technique a vehicle tracking system (VTS) can be built. A vehicle tracking system combines the use of automatic vehicle location of individual vehicles with software that collects these fleet data for a comprehensive picture of vehicle locations. Modern vehicle tracking systems commonly use GPS technology for locating the vehicle, but other types of automatic vehicle location technology can also be used. Vehicle information can be viewed on electronic maps via internet with specialized software. The history of vehicle tracking dates to the beginning of GPS technology in 1978. In the early years, the technology was not yet operational, due to an insufficient number of satellites orbiting the earth. On Jan. 17, 1994, after years of gradual growth, the final of the first 24 satellites was launched, and the GPS system was considered fully operational. Early GPS was designed primarily only for military but in 1996, President Bill Clinton determined that the system would be an asset to civilians as well as the military. This policy change made GPS technology available to the average individual, including fleet managers, who could see the benefit of using the technology to keep tabs on their vehicles. In the early days of fleet tracking, in order to properly track a fleet, each vehicle had to be enabled with a costly GPS device. The company was required to pay a typically high monthly fee to use the satellite tracking system. While helpful, these early systems were difficult to implement, costly to use and sometimes inconvenient for drivers and fleet management alike. Thus it took several 5years for the concept to catch on. In the earliest days, only large, wealthy fleets took advantage of the technology. The modern fleet tracking system provides the necessary data to fleet managers allowing them to run their operations more efficiently. Reports on driver behavior, vehicle performance and fuel use all make it easier for the fleet manager to cut costs and increase efficiencies. These systems go beyond simple reporting of each vehicle's location, offering fleet managers a wealth of information about their vehicles and their drivers. In many countries this VTS is available. There are some company like GP, ROBI provides Vehicle Tracking Service (VTS) which has some common features like tracking the vehicle using satellite GPS & GSM communication.



IOT Based Pollution and Temperature Monitoring System

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ABSTRACT

In this article we have discussed and analyze Internet of Things (IOT) based pollution and temperature monitoring system. This system monitoring start from traditional way to the most sophisticated computer has been used to monitor the pollution as well as temperature quality, however the fresh air, preferable sound and temperature is necessary for all human body, for that various technology has been used and some of this technology is really useful in order to provide a real time air, sound quality and temperature data. The aim of this paper is to highlight some technology which is used for air and sound pollution monitoring and identify the important research in this important area.

Keywords: IOT, Arduino uno, LM135, Sound Sensor, Wi-Fi Module

I. INTRODUCTION

The main objective of IOT based pollution and temperature Monitoring System is that the Air and sound pollution is a growing issue these days. Environmental monitoring is a systematic approach for observing and studying the condition of environment. For the healthy human being require to breath in a clean air but to increasing the transportation system fresh air get polluted. Many health related issues are arising from air pollution and temperature. Major source of air pollution is road traffic emission which emits the 97% of CO and 75% of NO. Therefore, air quality monitoring is needed in order to provide useful information about the pollution. Here we propose an air pollution as well as sound pollution monitoring system that allows us to monitor and check live air pollution as well as sound pollution in an area through IOT. The main mission of pollution and temperature quality monitoring network is to record the concentration of pollution

and deliver these information or data to the population to warn against the any danger.

IOT

The IOT allows objects to be sensed or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention.

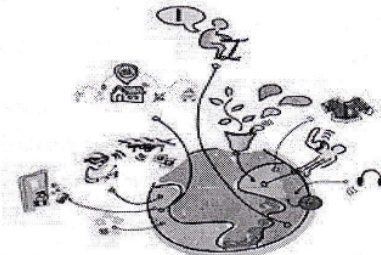


Fig1.IoT concept

When IoT is augmented with sensors and actuators, the technology becomes an instance of the more general class of cyber-physical systems, which also encompasses technologies such as smart grids, virtual



Analysis of Collector Performance Parameters in Three Sides Artificially Roughened and Glass Covered Solar Air Heater

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Abstract— Solar air heaters having artificially roughened absorber plate have been found to have higher heat transfer coefficient as compared to that of a solar air heater having a smooth (plane) absorber plate. A novel solar air heater with three artificially roughened absorber plates has been analyzed which result in more increase in heat transfer than that in only one side roughened solar air heaters. Optimal thermo hydraulic performance of one side roughened solar air heaters has been analyzed and investigated for the maximum heat transfer and the minimum pumping power (friction factor). The present paper deals with the results on collector performance parameters in three sides artificially roughened solar air heater with three sides glass covers. Results on the collector performance parameters, F_R ($\tau\alpha$) and $F_R U_L$, have been worked out with the help of the experimental data collected. The values of the collector heat removal factor, F_R and plate efficiency factor, F' , obtained, have been found to enhance in the range of 18 to 31 % and 20 to 25% respectively, as compared to one side roughened solar air heater and 51 to 60% and 41 to 49% respectively, as compared to smooth solar air heater, within the range of the parameters investigated.

Keywords— Collector roughness and flow parameters, collector performance parameters, heat removal factor, plate efficiency factor, collector thermal efficiency.

Nomenclature:-

C_p specific heat at constant pressure of air, kJ/kgK
 D hydraulic diameter of solar air heater duct, m
 e artificial roughness height, m
 e/D relative roughness height
 F collector efficiency factor
 F_R collector heat removal factor
 F_0 collector heat removal factor based on outlet temperature, t_0
 G mass flow rate per unit collector area, Kg/sm²
 L collector length, mm
 \dot{m} mass flow rate of air, Kg/s
 p roughness pitch, mm
 p/e relative roughness pitch
 Re Reynolds number
 t_a ambient air temperature, °C
 t_i inlet temperature of air, °C
 t_0 outlet temperature of air, °C
 $\tau\alpha$ Transmittance-absorptance product

η_{th} collector thermal efficiency
 W solar air heater duct width, m
 $1r$ one side roughened collector
 $3r$ three sides roughened collector

I. INTRODUCTION

Plenty of works are available to enhance the heat transfer coefficient in solar air heaters by providing artificial roughness of various geometries on the fluid flow side of the absorber plate. Small diameter wires were used [1-2] to analyze and investigate for the heat transfer coefficient. Transverse ribs have been used [3] to enhance heat transfer coefficient. Inclined rib roughness [4] wire mesh roughness [5], transverse protrusion wire roughness [6], wedge shape ribs [7], V-shape ribs [8], arc shape roughness [9], dimple shape roughness [10], combined inclined and transverse ribs [11], multi V-rib roughness [12], w-shaped ribs [13] are the works on analysis and investigations, where appreciable enhancement in heat transfer coefficient has been found quantitatively and qualitatively both.

The recent analyses [14-15] for three sides artificially roughened solar air heaters with three sides glass covers show even better results with respect to enhancement of heat transfer coefficient as compared to one side roughened solar air heaters. However, investigation on three sides roughened solar air heater with three sides glass covers, (being a novel one) is the most required. Based on the above analyses, the present paper deals with the results on collector performance parameters in three sides artificially roughened solar air heater with three sides glass covers. The enhancement of collector performance parameters with respect to collector heat removal factor, F_R , plate efficiency factor, F' , and thermal and performance have been dealt with in detail.

II. EXPERIMENTATION

The experimental set-up consists of two rectangular solar air heater ducts of similar size, three sides roughened and the smooth one. Fig. 1(a) shows the four sided smooth duct and Fig. 1(b) shows the present duct model with three roughened sides and one smooth surface. Circular wire of different diameters has been provided on the absorber plate at varying pitches to serve as an artificial roughness element. Fig. 2 (a)

A Review of Electro Thermal Cooling Systems with Heat Sink

Dr. Ashwini Kumar, Ravi Kumar, Dr. Arun Kumar Behura

Abstract— All electronic devices generate heat due to the current flow through them. Unless the heat is removed constantly the temperature of the devices will continuously increase leading to failure. Compared to the previous components like vacuum tubes, the heat generated by individual device is very small. But the developments from transistors, integrated circuits and microprocessor have resulted in millions of devices being packed into a chip of millimeter size. High heat flux of electronic devices, e.g. projector, LED, high power chip, etc., require efficient cooling methods for heat dissipation in a limited region. It means maintaining a small heat source at an acceptable temperature. The present paper reviews the literature dealing with various aspects of cooling methods. Included are papers on experimental work on analyzing cooling technique and its stability, numerical modeling, natural convection, and advanced cooling methods. The issues of thermal management of electronics, development of new effective cooling schemes by using advanced materials and manufacturing methods are also enumerated in this paper.

Index Terms— Fins, Grashoff number, Heat sink, Liquid impingement, Nusselt number, Rayleigh number

I. INTRODUCTION

From sophisticated satellites, rockets and aircrafts to simple appliances for everyday use like TV, home computer and cell phone depend on electronic devices for proper functioning. The reliability operation of such equipments depends very much on the reliability of electronic equipment which controls them. The electronics cooling is viewed in three levels, which are non separable. Firstly, to maintain the chip temperature at a relatively low, despite of high local heat density. Secondly, this heat flux must be handled at system or module level. Finally, the thermal management of the computer machine room, office space, or telecommunication enclosure. The thermal design of the system is influenced by the key drivers like chip size, power dissipation, junction temperature and ambient air temperature. The semiconductor industries are taking great amount of effort over the years to reduce the size of the devices. With the increase in power dissipation and reduction in the size, the growth in power density is expected to increase further over the next decade as shown in figs. 1 and

2 [1]. Heat is generated at the junction where the different regions of semiconductor (such as p and n type regions) come in contact. The diode is based on a single p-n junction, while transistor involves two junctions. The junctions being the sites of heat generation are the hottest spots in a component. In silicon based semiconductor devices the junction temperature is limited to 125°C for safe operation. In a typical application numerous electronic components, some smaller than 1 μm in size, are formed from silicon wafer into a chip. In order to study the various methods of cooling it is necessary to know about the way the components are arranged in equipment. However lower junction temperatures are desirable for extended life and lower maintenance costs. The increasing power density indicates the thermal management solutions play an important role in determining the future semiconductor device technology. The documentation of heat load in process equipment by a thermal management consortium also projects the increasing trend of power dissipation and its documentation is shown in fig. 3 [2]. Advanced thermal architecture is required to meet this stringent thermal requirement. The high chip temperature results in thermal failures such as mechanical stresses, thermal de-bonding and thermal fracture. The failure in electronics during operation occurs mainly due to temperature and is shown in fig. 4 [3]. Lasance [4] mentioned three typical reasons for the ever increasing importance of thermal management. The reasons are at the component level, designers try to minimize package dimensions while increasing power density, which makes the problem of minimizing the thermal resistance from junction to case, a crucial part of the package density. Secondly, the electronic industries thermal design tends to be an afterthought of the design process only if the prototype raises any thermal issues, and thirdly, the limit of pushing the use of air cooling with heat sink and fan is expected to be reached in the coming years.

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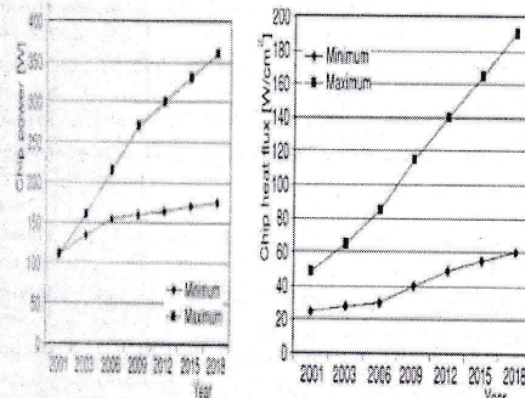


Fig.1. High performance chip power trend trends Fig.2. High performance chip heat flux



CFD Analysis of Solar Air Heater Having Corrugated Absorber Plate

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Abstract:— A CFD analysis is conducted through different turbulence models to study the performance of a solar air heater using corrugated absorber plate. A modern CFD code ANSYS FLUENT v 14.5 is used to simulate fluid flow and heat transfer through the solar air heater. Flow is assumed to be two-dimensional and the heat flux is considered at a constant value of 910 W/m². The present work show that the Renormalization-group k-epsilon model provides the results close to those, worked out from available empirical co-relation for two-dimensional steady flow solar air heaters.

Keywords: - CFD Analysis; Absorber plate; Solar air heaters; Nusselt number; Reynolds number.

Nomenclature

D_h	hydraulic diameter of duct, mm
P_h	wetted perimeter, mm
A	cross-sectional area, m ²
h	heat transfer coefficient, W/m ² K
k	thermal conductivity of air, W/mK
L_1	inlet length of duct, mm
L_2	test length of duct, mm
L_3	outlet length of duct, mm
H	depth of duct, mm
W	width of duct, mm
m	mass flow rate, kg/s

Dimensionless parameters

f	friction factor
f_c	friction factor of corrugated absorber plate
f_s	friction factor of smooth absorber plate
N_{uc}	Nusselt number
N_{uc}	Nusselt number of corrugated absorber plate
N_{us}	Nusselt number of smooth absorber plate
Pr	Prandtl number

R_e Reynolds number

W/H Duct aspect ratio

I. INTRODUCTION AND LITERATURE SURVEY

Solar energy is the major source of non-conventional energy but is used in very small proportion (approx 2%) compared to other sources of energy. Solar air heater consists of an absorber plate to capture insolation (incident solar radiation) and transfers thermal energy to the air by heat transfer. The thermal efficiency of a solar air heater having smooth absorber plate collector is low due to very low convective heat transfer coefficient between the absorber plate and the air which is flowing in the duct. The use of artificial roughness or corrugation on flow side of absorber plate is a very effective way to enhance the heat transfer to the flowing air in the duct but some pressure drop is occurred due to that. Solar air heaters are now widely used in many areas, such as, drying of agricultural products, seasoning of timber, space heating. Many researchers worked on solar air heater to enhance thermo-hydraulic performance. Bhagoria et al. [1] performed experiments to find out the effect of relative roughness pitch and height respectively on the heat transfer and friction factor in a solar air heater with wedge shaped rib roughness and found maximum enhancement of Nusselt number is up to 2.4 times whereas the friction factor increased by 5.3 times for the investigated range of parameters. Karim and Hawladar [2] and Karim et al. [3] experimentally found that the v-corrugated collector has superior thermal performance compare to flat plate collector. Lin et al. [4] found that cross-corrugated solar air-heaters have a better thermal performance than the flat-plate collector. Saini and Saini [5] from their performed experiments found 3.8 times enhancement in Nusselt number and 1.75 times enhancement in friction factor in duct having transverse ribs. Vishavjeet et al. [6] discussed that CFD analysis is now very important for the study of flow behaviour and various performance characteristics of solar air heater and it will be carried out to find optimum roughness parameters.

Pulsed Laser Micro Polishing of Metals Using Dual-Beam Technology

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Abstract: In this paper laser micro polishing with an additional laser beam for pre-heating of the surface is examined. The influence of the following process parameters on the surface roughness is examined: Pre-heating laser power, scanning velocity, beam offset of the two laser beams, and intensity distribution of the pre-heating laser beam. The two materials which were used for the experiments (martensitic tool steel and TiAl6V4) showed a different behavior: For martensitic tool steel the micro roughness was increased in comparison to conventional laser polishing with only one laser beam (single-beam technology) due to increasing formation of martensite. For TiAl6V4 the meso roughness of the surfaces was decreased in comparison to conventional laser micro polishing due to longer melt duration, so smoother surfaces were obtained (up to 36% lower surface roughness for one spatial wavelength regime).

Keywords: Laser micro polishing, Dual-beam technology, Pulse duration, Martensite formation

1. Introduction

Laser micro polishing with pulsed laser radiation is a surface finishing process to reduce the micro roughness. There have been several investigations on the fundamentals of this process, for example in Perry, 2009, Willenborg, 2005, and Nüsser et al., 2011. It has been investigated that the two most important parameters influencing the surface roughness after the polishing process are the power density, i.e. the intensity distribution, and the pulse duration. The intensity distribution must be homogeneous, i.e. top-hat like, and the pulse duration must be as long as possible for obtaining a low surface roughness after the polishing process (investigated pulse duration: 20-1.500 ns).

In this examination the influence of an additional laser beam for pre-heating of the surface is investigated. It is assumed that this process variant leads to a lower surface roughness

in comparison to the single-beam technology (conventional laser polishing).

UW-Madison researchers have developed a two-regime method to reduce rough surface features using a multiple-pass PLμP approach. In the first regime, melt pools are created on the surface using energy pulses, which generate higher temperatures where the beam is focused. Thermo capillary flow pulls down asperities into the melt pools. This can cause material to push up at the edge of the pools as they resolidify. A second regime applies different energy pulses to remove and/or rearrange the upwelled material.

2. Experimental Setup

For the investigations an experimental setup is used that allows the independent alignment and superposition of two laser beams, fig.1. The laser radiation is guided to the setup by optical fibers.

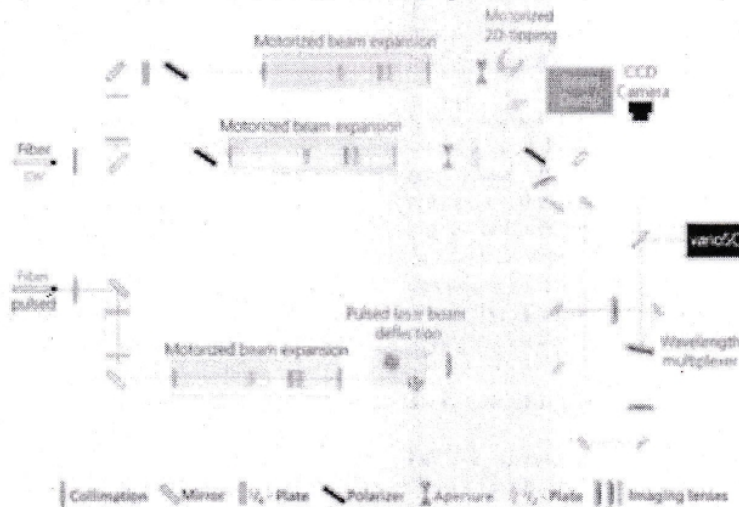


Figure 1: Experimental setup (Temmler et al., 2013)

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Wire Screen Matrices Packed Bed Solar Air Heater Performance-An Exergetic and Energetic Approach

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ABSTRACT.

The present work relates to the exergetic and energetic approach for the performance of packed bed solar air heaters with blackened wire screen matrices pack. The characteristic equations for heat transfer and fluid flow in packed bed solar air heaters have been used in order to analyze the effect of system and operating parameters on energy and energy performance. Finite difference solution algorithm has been developed to obtain numerical solutions of the governing equations. Results revealed that mass flow rate of air are a strong parameter affecting the effective and energetic efficiencies. The energy efficiency increases with increase in mass flow rate whereas energetic efficiency decreases with increase in mass flow rate. It has been found that the effective thermal energy gain and effective efficiency increases up to a specific value of mass flow rate, attains maxima and then decreases sharply. Results also show that there exists an optimum value of bed depth for a given matrix. The optimum bed depth of packed bed solar air heater with absorber M5 is found to be 25 mm. The effect of air temperature rise on energy and energy performance of packed bed solar air heater having absorber M5 for variable insolation has also been reported.

Keywords: Bed depth, solar air heater, solar energy, packed bed.

Nomenclature

- A_{ab} Absorber plate area, m²
 A_{sw} Surface area of wire screen, m²
 A_{cs} Bed cross-sectional area, m²
 A_d Surface area per unit volume of duct, m⁻¹

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HEAT SINK DESIGN FOR OPTIMAL PERFORMANCE OF COMPACT ELECTRONIC APPLIANCES - A REVIEW

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ABSTRACT.

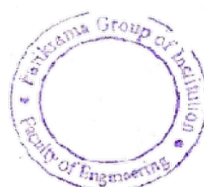
The ever rising transistor densities and switching speeds in microprocessors have been accompanied a dramatic increase in the system heat flux and power dissipation. In this context the rising IC densities combined with even more stringent performance and reliability requirement have made thermal management issues ever more prominent in the design of sophisticated microelectronic systems. So in order to achieve a high degree power dissipation extruded heat sinks, a number of research works have been done in last two decades. It is observed that components of modern portable electronic devices with increasing heat loads with decrease in the space available for heat dissipation. The increasing heat load of the device needs to be removed for maintaining the efficient performance of the device. The exponential increase in thermal load in air cooling devices requires the thermal management system to be optimized to attain the highest performance in the given space. In the present paper a review report on comprehensive description for thermal conditions for cooling purpose within the heat sink for electronic devices has been summarized.

Keywords: Heat sink, CFD, Heat transfer, Cooling system, Heat pipe.

INTRODUCTION AND LITERATURE SURVEY

In the present time of scientific era, the rapid development of electronic technology, devices and appliances takes an important place in our daily lives. However, as the component size shrinks there is a dramatic increment in the heat flux per unit area, due to which the working temperature of the electronic components may exceed the desired temperature level. And therefore, by promoting the heat transfer rate and maintaining the die at the desired operating temperatures, the condition for a reliable electronic component can be made into existence. Electronic components and assemblies tend to be of a small scale and they are typically cooled by air flowing at moderate velocities. The combination of small dimensions, the use of air as the cooling fluid and low velocities normally results in laminar convection and hence correspondingly low values for heat transfer coefficients.

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A REVIEW OF OPTIMAL RADIAL BLOWER DESIGN FOR ELECTRONIC COOLING SYSTEM

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ABSTRACT.

Cooling system fans have been used to cool electronics for a long time. However, the recent trends of changes in electronic devices call for an evolved electronic cooling fan which can effectively dissipate heat in electronics that have even more power in smaller packages. Heat production in much equipment continues to rise as compact consumer electronics products increase in power and functionality. Though the size of electronics may be small, the amount of heat generated can be enormous. A few examples of this case are: laptop computers with powerful processors, projection systems in which heat is generated by the light source, and even set-top boxes. To generate air flow around heat generating components in electronic equipment and to dispel heat effectively requires active cooling with the help of fans. In the present paper a review report on comprehensive description for thermal conditions for cooling purpose with the help of an optimally designed radial blower, for electronic devices has been summarized.

KEYWORDS: CFD, Icepack, Radial Blower, Fan Curve, Thermal Analysis, Macro Model, System Level Modeling, Experimental Measurements

INTRODUCTION AND LITERATURE SURVEY

Fans are commonly used to refrigerate electrical machines when air forced cooling is required. They are rather simple solutions that can considerably improve the thermal performance of electrical machines, so the fan analysis could become an important point during the thermal design of electrical machines. These are widely used for electrical machines cooling when natural convection is insufficient to ensure a maximum working temperature and liquid cooling systems are too complex for specific applications. Fans impulse airflows over motor surfaces and generate forced convection as an alternative to the natural convection. So these systems can increase the external heat transfer. On the other hand, liquid cooling systems improvements are much higher than forced convection. But they need a more complex tubes system to transport the liquid, with its drive system, and a final heat exchange to transport the heat to the ambient by natural or forced air convection.

To Cite This Article: Kiran Patil, Subham Kharche, Abhijit Mate, Satish Chaudhari, Dr. Ashwini Kumar, Prof. Kiran Londhe and Prof. Vipul R. Kaushik., A REVIEW OF OPTIMAL RADIAL BLOWER DESIGN FOR ELECTRONIC COOLING SYSTEM. Journal for Advanced Research in Applied Sciences. Volume 4, Issue 5, Oct-2017; Pages: 41-47



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A REVIEW REPORT ON ROBOTIC SYSTEM FOR SURVILLIANCE

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ABSTRACT.

21st century is the era of modern engineering and one of the emerging technologies of engineering is robotics and its applications in comfort of human being. Robotics is the combine techniques of mechatronics and mechanical used to make complex work simpler. A robot is a reprogrammable, multifunctional manipulator designed to move material, parts, tools, or specialized devices through variable programmed motions for the performance of a variety of tasks. The purpose of the present review article is to summarize and collect all the major information about robot systematic performance on a common platform.

Keywords: Robotic system, intelligent surveillance, Military robots, Autonomous robots.

INTRODUCTION AND LITERATURE SURVEY

In the last couple of decades robotics has been a staple of advanced manufacturing for over half a century. As robots and their peripheral equipment become more sophisticated, reliable, and miniaturized, these systems are increasingly being utilized for entertainment, military, and surveillance purposes. A remote controlled surveillance robot is defined as any robot that is remotely controlled to capture images and videos for specific purposes. Robotics is an interdisciplinary branch of engineering and science that includes mechanical engineering, electrical engineering, computer science, and others.

Robotics deals with the design, construction, operation, and use of robots, as well as computer systems for their control, sensory feedback, and information processing. These technologies are used to develop machines that can substitute for humans. Robots can be used in any situation and for any purpose, but today many are used in dangerous environments manufacturing processes, or where humans cannot survive. Robots can take on any form but some are made to resemble humans in appearance. This is said to help in the acceptance of a robot in certain explicative behaviors usually performed by people. Such robots attempt to replicate walking, lifting, speech, cognition, and basically anything a human can do.

Many of today's robots are inspired by nature, contributing to the field of bio-inspired robotics. The concept of creating machines that can operate autonomously dates back to classical times, but research into the functionality and potential uses of robots did not grow substantially until the 20th century. Throughout history, it has been frequently assumed that robots will one day be able to mimic human behavior and manage tasks in a human-like fashion. Today, robotics is a rapidly growing field, as technological advances continue; researching, designing, and building new robots serve various practical purposes, whether domestically, commercially, or militarily. Many robots are built to do jobs that are hazardous to people such as defusing bombs, finding survivors in unstable ruins, and exploring mines and shipwrecks.

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A REVIEW REPORT FOR HEAT TRANSFER AND FLUID FLOW CHARACTERISTICS

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DOI: 10.5281/zenodo.1034495

KEYWORDS: Relative roughness pitch, (p/e); Relative roughness height, (e/D); Flow Reynolds number, (Re); Nusselt number, (Nu_{3r}); Collector roughness and flow parameters; Collector performance parameters; Collector thermal efficiency, (η_{th}); Thermo hydraulic efficiency, (η_{thermo}).

NOMENCLATURE

B Solar air heater duct height, m

B^{-1} Stanton number roughness parameter; $B^{-1} = G_H - P_r R_M$

C^{-1} Efficiency roughness parameter; $C^{-1} = 2.5 \ln e^+ + 5.5 - R_M$

D Hydraulic diameter of solar air heater duct, m

e Roughness height, m

e/D Relative roughness height

e^+ Roughness Reynolds number = $e/D \sqrt{\left(\frac{f_r}{2}\right)} Re$

e^+_{opt} Optimal value of e^+

f Friction factor

G_H Heat transfer roughness function; $G_H = 4.5(e^+)^{0.28} p_r^{0.57}$

L^{-1} Efficiency parameter; $L^{-1} = C^{-1} - B^{-1}$

P Pitch of roughness element, m

p/e Relative roughness pitch

P_r Prandtl number

p_r Turbulent prandtl number

f_r Friction factor in roughened collector

\bar{f}_r Average friction factor

Re Reynolds number

R_M Momentum transfer roughness function; $R_M = 0.95 (p/e)^{0.53}$

f_s Friction factor in smooth collector

S_t Stanton number

\bar{S}_t Average stanton number

\bar{S}_{tr} Average stanton number

W Width of solar air heater

u Velocity, m/s

u^+ Dimensionless velocity; $u/\sqrt{\tau_0/\rho}$



Performance Of Solar Air Heaters With Corrugated Absorber Plate- A CFD Approach

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Abstract: In recent years CFD has been applied in the design of solar air heater. The studies reported that the quality of the solutions obtained from CFD simulations are largely within the acceptable range proving that CFD is an effective tool for predicting the behavior and performance of a solar air heater. The thermal performance of conventional solar air heater is lower as compared to that of corrugated absorber plate solar air heaters. There are various types of corrugation like W-shape, V-shape; sine wave shape etc. can be used as absorber plate. The use of corrugation in different forms and shapes is an effective and economic way of improving the performance of solar air heaters. Use of corrugated absorber plate in solar air heater duct increases the Nusselt number and the friction factor with the increase in mass flow rates, the Nusselt number increases and the friction factor decreases for all combination of mass flow rates. In the present investigation the effect of flow parameters on flow field, temperature field and heat transfer has been analyzed. Also the comparison of the result obtained by the present CFD analysis with previous experimental results has been shown.

Keywords: CFD Analysis; Absorber plate; Solar air heaters; Nusselt number; Reynolds number.

NOMENCLATURE

D_h	hydraulic diameter of duct, mm	f_s	friction factor of smooth absorber plate
P_h	wetted perimeter, mm	N_{tu}	Nusselt number
A	cross-sectional area, m^2	N_{uc}	Nusselt number of corrugated absorber plate
h	heat transfer coefficient, W/m^2K	N_{us}	Nusselt number of smooth absorber plate
k	thermal conductivity of air, W/mK	Pr	Prandtl number
L_1	inlet length of duct, mm	Re_g	Reynolds number
L_2	test length of duct, mm	W/H	Duct aspect ratio
L_3	outlet length of duct, mm	δ	Transition sub-layer thickness, mm
H	depth of duct, mm	μ	Dynamic viscosity, Ns/m^2
W	width of duct, mm	ρ	Density of air, kg/m^3
m	mass flow rate, kg/s	τ	Wall shear stress, Kg/m^2
ΔP	pressure drop, Pa		
f	friction factor		
f_c	friction factor of corrugated absorber plate		



Metal Loaded Low Profile and Compact Dielectric Resonator Antenna for WiMAX/WLAN Applications

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ABSTRACT.

In this paper; a metal loaded coaxial fed low profile and Compact cylindrical dielectric resonator antenna (LPCDRA) is presented. Metal insertion is done for antenna miniaturization. This Low Profile Antenna is designed for WiMax/WLAN application and its input and radiation characteristics determined through the Ansoft High Frequency Structure Simulator (HFSS) Software and compared with CST Software. The proposed antenna provides wide Bandwidth (21%) and high average gain (4.83 dBi) with Monopole type Radiation Pattern. The antenna also provides a miniaturization of 20%.

Keywords— Cylindrical DRA, Low Profile DRA; WiMax/WLAN Band; Coaxial Probe fed; Monopole type Antenna

I. INTRODUCTION

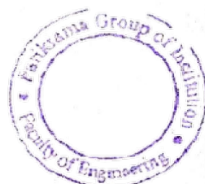
The Dielectric Resonator antenna (DRA) offers small size, mechanical simplicity, high radiation efficiency due to absence of inherent conductor loss, and no surface-wave losses [1]. DRAs enjoy more design flexibility in terms of shape such as cylindrical, hemispherical, rectangular etc. [2-4] and feeding mechanisms such as probe coupling [5], micro strip coupling [6], coplanar coupling [7] and aperture coupling [8]. However, one major limitation of the DRA is its limited bandwidth. To overcome this limitation, various bandwidth enhancement techniques have been developed such as optimizing the feeding mechanisms and DRA parameters, stacking multiple DRAs [9,10], inserting an air gap in the DR to lower the Q-factor [11,12], and changing the shape of DRA [13]. Miniaturization of Antenna can be achieved by introducing high dielectric material as the resonating part and insertion of metal plates onto the top and outer surfaces and centre as well as of the antenna [14, 15]. Multi-element DRAs can be used to achieve a much wider bandwidth compared to the single-element structure, or to realize operation at two bands for the same linear polarisation [16].

In this article, we have discussed the metal loaded cylindrical DRA for WiMax/WLAN applications. The metal is inserted inside the cylindrical DRA for miniaturization of antenna. By doing so the Radial Wave-number k_r contracted as compared to conventional CDRA and hence Resonate Frequency drooped.

II. ANTENNA STRUCTURE

Figure 1(a) demonstrates the Side View of the Metal Loaded LPDRA. It consists of ceramic material of dielectric constant $\epsilon_r = 9.8$ (Alumina) and loss tangent $\tan\delta = 0.0021$ acting as Cylindrical DRA. The Cylindrical DRA is placed on a Substrate made by FR4 ($\epsilon_r = 4.4$) further over headed by copper metallic ground plane of size $L_g \times W_g$ mm². The inner and outer Diameters of the Loaded Metal Ring are taken as $a=4$ mm and $b=5$ mm respectively. In this antenna, coaxial probe fed excitation is used. The advantage of this type of excitation is that the antenna system can be directly connected to a 50 Ω circuit without the aid of any matching network. The probe height (H_p) above the surface of ground plane is found to be 4.8 mm through simulation using Ansoft's HFSS software to provide lowest return loss at resonant frequency. The optimized values of the parameters of the proposed antenna are given in Table 1.

To Cite This Article: Vipul Ranjan Kaushik and Ravi Kumar Gangwar „Metal Loaded Low Profile and Compact Dielectric Resonator Antenna for WiMAX/WLAN Applications. Journal for Advanced Research in Applied Sciences ; Pages: 34-37



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System Design and Result Analysis for Dielectric Resonator Antenna-A Review

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Abstract

This article describes the fundamental concepts and theory of system design for Dielectric Resonator Antenna (DRA). The methodology for designing and simulation of DRA and result analysis of various parameters of the antenna such as return loss, gain, radiation patterns etc. are also explained. The article also discussed the basic algorithms and simulation steps for simulation of DRA using An soft High Frequency Structure Simulator (HFSS) software. The method of characterization of the DR and the basic facilities used for the measurement of antenna parameters are also highlighted.

I.INTRODUCTION

A dielectric resonator antenna has a dielectric layer and a conducting layer formed on a main surface of the dielectric layer. An electrical contact is formed on the main surface for connecting the dielectric layer to a transmission line for transferring a signal between the dielectric layer and the transmission line. The electrical contact is insulated from the conducting layer. A conducting strip is connected to the electrical contact and is on a side surface of the dielectric layer. The side surface is not on the same plane of the main surface. Rather, the side surface is perpendicular to the main surface of the dielectric layer. A dielectric resonator antenna (DRA) is a radio antenna mostly used at microwave frequencies and higher, that consists of a block of ceramic material of various shapes, the dielectric resonator, mounted on a metal surface, a ground plane. Radio waves are introduced into the inside of the resonator material from the transmitter circuit and bounce back and forth between the resonator walls, forming standing waves. The walls of the resonator are partially transparent to radio waves, allowing the radio power to radiate into space.^[1] An advantage of dielectric resonator antennas is they lack metal parts, which become loss at high frequencies, dissipating energy. So these antennas can have lower losses and be more efficient than metal antennas at high microwave and millimetre wave frequencies. Dielectric waveguide antennas are used in some compact portable wireless devices, and military millimetre-wave radar equipment. The antenna was first proposed by Robert Richtmyer in 1939. In 1982, Long et al. did the first design and test of dielectric resonator antennas considering a leaky waveguide model assuming magnetic conductor model of the dielectric surface. An antenna like effect is achieved by periodic swing of electrons from its capacitive element to the ground plane which behaves like an inductor. The authors further argued that the operation of a dielectric antenna resembles the antenna conceived by Marconi, the only difference is that inductive element is replaced by the dielectric material.

The size of the DRA is proportional to $\lambda_0/\sqrt{\epsilon_r}$, with $\lambda_0 = c/f_0$ being the free-space wavelength at the resonant frequency f_0 and where ϵ_r denotes the relative permittivity of the material forming the radiating structure. As compared to traditional metallic antennas whose size is proportional to λ_0 , DRAs are characterized by a smaller form factor especially when a material with high dielectric constant (ϵ_r) is selected.

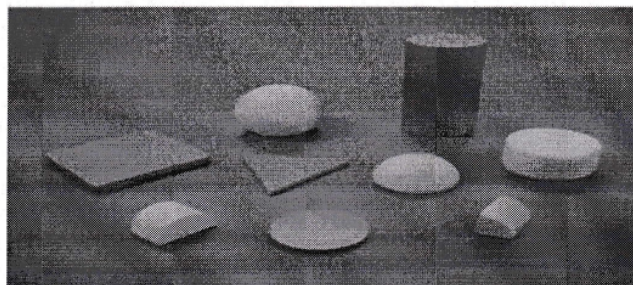


Figure 1. DRAs of various shapes [1]



Dielectric Resonator Antenna and its Design Parameters-A Review

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Abstract— This article describes the fundamental concepts and theory of system design for Dielectric Resonator Antenna (DRA). The methodology for designing and simulation of DRA and result analysis of various parameters of the antenna such as return loss, gain, radiation patterns etc. are also explained. The article also discussed the basic algorithms and simulation steps for simulation of DRA using Ansoft High Frequency Structure Simulator (HFSS) software. The method of characterization of the DR and the basic facilities used for the measurement of antenna parameters are also highlighted.

I. INTRODUCTION

A dielectric resonator antenna has a dielectric layer and a conducting layer formed on a main surface of the dielectric layer. An electrical contact is formed on the main surface for connecting the dielectric layer to a transmission line for transferring a signal between the dielectric layer and the transmission line. The electrical contact is insulated from the conducting layer. A conducting strip is connected to the electrical contact and is on a side surface of the dielectric layer. The side surface is not on the same plane of the main surface. Rather, the side surface is perpendicular to the main surface of the dielectric layer. A dielectric resonator antenna (DRA) is a radio antenna mostly used at microwave frequencies and higher, that consists of a block of ceramic material of various shapes, the dielectric resonator, mounted on a metal surface, a ground plane. Radio waves are introduced into the inside of the resonator material from the transmitter circuit and bounce back and forth between the resonator walls, forming standing waves. The walls of the resonator are partially transparent to radio waves, allowing the radio power to radiate into space.^[1] An advantage of dielectric resonator antennas is they lack metal parts, which become loss at high frequencies, dissipating energy. So these antennas can have lower losses and be more efficient than metal antennas at high microwave and millimetre wave frequencies. Dielectric waveguide antennas are used in some compact portable wireless devices, and military millimetre-wave radar equipment. The antenna was first proposed by Robert Richtmyer in 1939. In 1982, Long et al. did the first design and test of dielectric resonator antennas considering a leaky waveguide model assuming magnetic conductor model of the dielectric surface. An antenna like effect is achieved by periodic swing of electrons from its capacitive element to the ground plane which behaves like an inductor. The authors further argued that the operation of a dielectric antenna resembles the antenna conceived by Marconi, the only

difference is that inductive element is replaced by the dielectric material.

The size of the DRA is proportional to $\lambda_0/\sqrt{\epsilon_r}$ with $\lambda_0 = c/f_0$ being the free-space wavelength at the resonant frequency f_0 and where ϵ_r denotes the relative permittivity of the material forming the radiating structure. As compared to traditional metallic antennas whose size is proportional to λ_0 , DRAs are characterized by a smaller form factor especially when a material with high dielectric constant (ϵ_r) is selected.

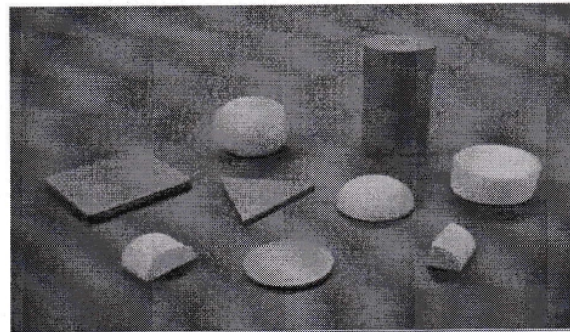


Figure 1. DRAs of various shapes^[1]

Due to the absence of conducting material, the DRAs are characterized by high radiation efficiency when a low-loss dielectric material is chosen. This characteristic makes them very suitable for applications at very high frequencies, such as in the range from 30GHz to 300GHz. As a matter of fact, at these frequencies, traditional metallic antennas suffer from higher conductor losses. DRAs can be characterized by a large impedance bandwidth if the dimensions of the resonator and the material dielectric constant are chosen properly. DRAs can be excited using different techniques which is helpful in different applications and for array integration. The gain, bandwidth, and polarization characteristics of a DRA can be easily controlled using different design techniques.

1. Feeding Techniques:

Microstrip patch can be excited either directly or indirectly. Feeding technique influences the input impedance and characteristics of the antenna. It is an important design parameter. Some general feeding arrangements are described below.

1. *Microstrip line feed*: In this type of feed technique, a conducting strip is connected directly to the edge of the

A CFD Approach to Show the Performance of Solar Air Heaters with Corrugated Absorber Plate

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Abstract

The thermal performance of conventional solar air heater is lower as compared to that of corrugated absorber plate solar air heaters. There are various types of corrugation like W-shape, V-shape; sine wave shape etc. can be used as absorber plate. The studies reported that the quality of the solutions obtained from CFD simulations are largely within the acceptable range proving that CFD is an effective tool for predicting the behavior and performance of a solar air heater. The use of corrugation in different forms and shapes is an effective and economic way of improving the performance of solar air heaters. Use of corrugated absorber plate in solar air heater duct increases the Nusselt number and the friction factor with the increase in mass flow rates, the Nusselt number increases and the friction factor decreases for all combination of mass flow rates. In the present investigation the effect of flow parameters on flow field, temperature field and heat transfer has been analyzed. Also the comparison of the result obtained by the present CFD analysis with previous experimental results has been shown.

Keywords: - CFD Analysis; Absorber plate; Solar air heaters; Nusselt number; Reynolds number.

Nomenclature

D_h	hydraulic diameter of duct, mm
P_h	wetted perimeter, mm
A	cross-sectional area, m ²
h	heat transfer coefficient, W/m ² K
k	thermal conductivity of air, W/mK
L_1	inlet length of duct, mm
L_2	test length of duct, mm
L_3	outlet length of duct, mm
H	depth of duct, mm
W	width of duct, mm
m	mass flow rate, kg/s
ΔP	pressure drop, Pa
f	friction factor
f_c	friction factor of corrugated absorber plate
f_s	friction factor of smooth absorber plate
N_{uc}	Nusselt number
N_{uc}	Nusselt number of corrugated absorber plate
N_{us}	Nusselt number of smooth absorber plate
Pr	Prandtl number



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RESEARCH ARTICLE

ODOR MEASUREMENT TECHNIQUES/METHODS USED IN KURKUMBH

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ABSTRACT

Odor pollution in the environment will be considered, together with its sources and smattering, the physical and chemical properties of odor, odor emission regulations in selected countries, odor control technologies as well as the state-of-the-art instrumentation and technology that are necessary to monitor odor, e.g., chemical sensors, olfactometry, gas chromatography, and electronic noses. With today's increasing levels of progress, residential areas are predictably built closer to odour generating facilities pharmaceuticals industries and chemical industrial plants. Odour measurements, which provide important information in the planning of the plants and odour treatment facilities, are needed to underpin the numerous decisions that will have to be made to reduce odour nuisance. An odour emission regularly consists of a multifarious mixture of many odorous composites. Analytical monitoring of individual chemical compounds present in such odour is usually not practical. As a result, odour sensory methods, in its place of instrumental methods, are normally used to measure such odour. Odour sensory methods are available to monitor odour both from source emissions and in the ambient air. These two different situations require different methodologies for measuring odour. Thus the sensitivity of the odour sensory method must be significantly greater for measuring ambient odour than for source odour emissions. For known compounds, the Odourstrong point can be steadfastly estimated by measuring the awareness of the chemical, while, for mixtures of unknown substances, sensory method is preferred. It consists of a sensor which is used to detect the presence of gases namely ammonia and hydrogen sulphide. As this is a daily activity, the sensors are also used to monitor them regularly for a better health. The main advantage of our model is that the sensor does a regular act in monitoring them from their daily activities. This paper describes the arduinouno based odor sensory measurement system used in kurkumbh industrial area.

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INTRODUCTION

Odor substances emitted from any source will be regarded important in the context of odor pollution if they are dispersed in the surrounding area. This means that odor particles are dispersed from the odor sources into the environment. Without any dispersion process odor production will not result in complaints by the people in the surrounding area. For that reason, many researchers have studied odor dispersion in the atmosphere, using not only a model but also direct measurements. Odor, which refers to unpleasant smells, is considered as an important environmental pollution issue. Attention to odor as an environmental nuisance has been growing as a result of increasing industrialization and the awareness of people's need for a clean environment. As a consequence, efforts to abate odor problems are necessary in

order to maintain the quality of the environment. In this structure, understanding the odor problem and the origin and circulation of odors, reduction and detection methods are, therefore, very important phases of odor pollution in the environment. One of the challenges when dealing with the odor pollution problem is the technique for the finding of odor emissions. Detection is an important phase regarding capacity with the environmental techniques, since the detection results will be used as proof of the release of odorous substances to the environment. A successful and excellent detection technique will result in a sequence of accountably data. A reliable instrument, therefore, is necessary. There is a growing tendency in industry to develop a detection system that enables real-time measurements. In this way, a simple and quick online-monitoring system can be established and time-consuming methods avoided. Sampling and conventional analytical procedures are then no longer necessary, since the detection and measurement of the odorous compounds can be carried out quickly and the results presented on demand. Odour

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Odour Reducing Technique in Field at Kurkumbh

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Abstract: Rapidly growing industrialization has aggravated the problem through odorous industrial operations. Undesirable odor contributes to air quality concerns and affect human lifestyles. Odor is absolutely the most multifarious of all the air pollution problems. Controlling of odors it is required to identify the sources of odor and their type i.e. point sources and Area sources within Kurkumbh industrial area, to knowing wind speed, wind direction, temperature, humidity etc. by plotting wind rose diagram for Kurkumbh and understand that wind is blowing from north to south. In our study we define the total nine locations for measurement of intensity of odors compound that is hydrogen sulfide and ammonia. The issue of odours is very important because odorants can be an extreme nuisance and, with sufficient exposure, they can induce adverse health effects, such as nausea, vomiting, headache, loss of appetite, sleeplessness, upset stomach, and throat irritation depreciation of property values. In this paper odor pollution in the air within Kurkumbh industrial area of Daund region of Pune district is studied, including its sources and distribution, the physical and chemical properties of odor, odor emission regulations in Maharashtra. It was observed that the most feasible option to carry out an odor survey in India is to use Field Investigation Method. Applied field investigation method was modified to fit India's need to measure different odor intensities based on the Arduino uno sensor that clearly recognizable odor is observed as an annoyance. It consists of a sensor which is used to detect the presence of gases namely ammonia and hydrogen sulfide. In Kurkumbh at the time of odor survey understand that the total intensity before and after the vegetative buffer were reduced by over 30% and odorous compound concentrations for hydrogen sulfide and ammonia gas compounds were reduced by 30 to 40 % and 10 to 20 % respectively. The main advantage of our model is that the sensor does a regular act in monitoring them from their daily activities.

*Keywords: - Odor, Odor pollution, Vegetative Buffer, Olfactometry, ArduinoUno, Sensor.

I. Introduction

When emissions comprising odorants are free to the atmosphere they can have an impact on the environment. Although under some circumstances this could include an impact on the ecosystem or on human health that would be a factor of the chemical environment (e.g. toxicity) of the relief rather than its odorous nature. Odor, which refers to unpleasant smells, is considered as an important environmental pollution

issue. Responsiveness to odor as an environmental annoyance has been growing as a result of increasing industrialization and the awareness of people's need for a clean environment. One of the challenges when dealing with the odor pollution problem is the technique for the detection of odor emissions. Recognition is an important part concerning agreement with the environmental guidelines, since the detection results will be used as proof of the release of odorous substances to the environment. A successful and excellent detection technique will result in a sequence of accountably data. A reliable instrument, therefore, is necessary. There is a growing tendency in industry to develop a detection system that enables real-time measurements [4]. In this way, a simple and quick online-monitoring system can be established and time-consuming methods avoided. Sampling and conventional analytical procedures are then no longer necessary, therefore the detection and measurement of the odorous compounds can be carried out quickly and the results presented on demand by using arduino uno based sensory system. Kurkumbh is located in Daund Taluka of Pune District at latitude 18° 24'25.55" N and Longitude: of 74° 30'16.08" E on Pune Sholapur National High Way No. 9. It is 75 Kms away from Pune and 10 kms. Away from Daund Railway Junction. Elevation above MSL, 2092 Ft. above Mean Sea Level. The nearest airport for this location is at Pune [10]. Kurkumbh industrial area is selected for the execution of research work. Kurkumbh Environment Protection C6-Op. Society Ltd. And Regional Officer -Pune MPCB is responsible authority for Prediction of impacts is an environmental impact assessment process. There are many chemical and pharmaceutical industries in the study area. Odour pollution has definitely different characteristics and is unquestionably the most complex of all the air pollution problems. The duration of odour impact depends on the variation in time of odorous emissions from the source. In addition, climatic conditions can be a strong impact on the duration of odour impact. Stable meteorological conditions, which can be more common overnight, can lead to events of longer duration. Sensitisation is where perceived intensity increases with repeated or continuous exposure. A person's feeling to odour can depend on the location of the acceptance environment. The land-use in India is complicated, as residential areas develop close to industrial regions the impacts from odorous substances generated from industrial activities, (e.g. pulp paper, distillery, sugar, bulk drug, pharmaceuticals, chemical and pesticides) result in increasing public complaints. Odor, which refers to unpleasant smells, is considered as an important environmental pollution issue. [3] the problem of odours is very important because odorants can be an dangerous annoyance and, with sufficient exposure, they can induce

Study and Analysis of Odour of Hydrogen Sulfide and Ammonia Gas within Kurkumbh Industrial Area

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Abstract: Attention to odor as an environmental nuisance has been growing as a result of increasing industrialization and the awareness of people's need for a clean environment. As a consequence, efforts to abate odor problems are necessary in order to maintain the quality of the environment. It also presents an overview of current and emerging odor measurement techniques, including those based on sensory measurements (i.e., relying on the human experience of odor), and chemical analysis techniques, in which certain chemicals are identified as "surrogates" for odor and measurement is aimed at identifying the amount of these chemicals present in the ambient air. Typical source types for odor are also described in this chapter, along with the chemicals often associated with the odors they generate. Examples of gas surrogates include (ammonia [NH₃], hydrogen sulfide [H₂S]) In this paper, odor pollution in the environment will be reviewed, including its sources and dispersion, the physical and chemical properties of odor. The measured gas concentrations were generally below the permissible exposure limits (PELs) established by the Occupational Safety and Health Administration (OSHA). One of the challenges when dealing with the odor pollution problem is the technique for the detection of odor emissions the detection and measurement of the odorous compounds i.e. Hydrogen sulfide and ammonia can be carried out by using sensor at different location within kurkumbh industrial area.

Keywords: odor, odor, ammonia, hydrogen sulfide, instrumentation, sensory

1. Introduction

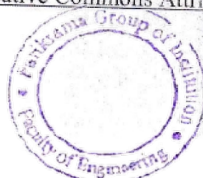
Odors are defined as sensations that occur when chemical substances (called odorants) stimulate receptors in the nasal cavity. Most odors perceived in the environment are made up of a multifaceted mixture of odorants. Odour is sensory response to the chemicals in the inhaled air. Air quality is affected not only due to conventional air pollutants but also due to unpleasant odors. The usual effect of bad odours is nuisance, but in more serious cases it may lead to feelings of nausea and headache and to other symptoms that appear to be related to stress/odour pollution has distinctly different characteristics and is undoubtedly the most complex of all the air pollution problems. Till date, not much attention has been paid towards odour problem in the country. With growing population, industrialization and urbanization, the odour problem has been assuming objectionable proportion the compounds that make up particular odors are often present in small concentrations and can act in the human nose in a complex effect making their regulation by the setting of emissions limits (as is standard for other ambient air pollutants) complicated. The effects of odors are equally complicated and range from the associative and the psychological to the measurable and the physiological. A particular odor may elicit various behaviors, from the attraction to a potential meal, to a warning of present danger or potential sickness. The sense of smell and memory appear to be closely tied together. The most frequently reported health effects of odors are described as eye, nose, and throat irritation, headache, nausea, diarrhea, hoarseness, sore throat, cough, chest tightness, nasal congestion, palpitations, shortness of breath, stress, drowsiness, and alterations in mood. Ammonia and hydrogen sulfide are common trace

gases in the atmosphere with a major contribution coming from pharmaceutical industries. In addition to their malodorous nature, both (ammonia [NH₃], hydrogen sulfide [H₂S]) although almost all persons possess the ability to sense odors, it is a phenomenon not well understood by most. A number of researches on the development of odor detection systems are currently being carried out to improve the present systems. The development of new, appropriate systems that are based on devices rather than on the human sensory system are important for increasing the acceptance by stakeholders and avoiding subjectivity in odor measurements. In this paper describe both ammonia [NH₃] and hydrogen sulfide [H₂S] gas odour within kurkumbh industrial area daund region district pune measured the intensity of those gasses by using sensor MQ136 and MQ 135. Compared with the permissible exposure limits (PELs), Occupational Safety and Health Administration (OSHA) and WHO'S a standard. It consists of a sensor which is used to detect the presence of gases namely ammonia and hydrogen sulphide. As this is a daily activity, the sensors are also used to monitor them regularly for a better health. The main advantage of our model is that the sensor does a regular act in monitoring them from their daily activities. The main challenge for developers is to have high selectivity of the metal-oxide gas sensors. There are two approaches generally for enhancing the sensors in selective properties. First one is specifically made sensitive to one compound and has low or zero cross-sensitivity to other compounds that are present in the atmosphere. Second approach is related to the preparation of materials for discrimination between several analytes in a mixture. Kurkumbh is located in Daund Taluka of Pune District at a latitude 18.10683 and Longitude: of 75.77747, on Pune Sholapur National High Way No. 9. It is

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Evaluation of Odour Intensity by Using Arduino Uno Based Odour Sensory Method

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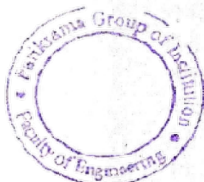
Abstract: - Odor pollution is one of the most complicated issue in the environment at kurkumbh industrial area. I studied its sources and dispersion, the physical and chemical properties of odor, odor emission regulations in our countries, odor control technologies as well as the state-of-the-art instrumentation and equipment that are necessary to monitor odor, e.g., chemical sensors, olfactometry, gas chromatography, and electronic noses. In kurkumbh there are many chemical and Pharmaceutical industries these industries release many of Odorous compound in surrounding environment i.e. hydrogen sulfide (H_2S). Odor survey was conducted at each place of work and characteristics of odor release for each kind of business were made clear. And many researches and developments have been carried out to confirm reliable technique. Odor pollution abatement has involved a number of bodies. A complete explanation of pollution abatement and the development of the accompanying instrumentation technology are therefore critical links to understand the whole dimension of odor pollution in the environment. We describe the applicability of these sensor-based methods with respect to practicality in various environmental settings. Finally, we highlight the limitations and the future prospects of these sensor-based methods.

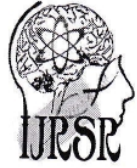
Key words: - odour, odour pollution, Arduino, MQ135 Sensor, MQ136 Sensor, olfactometry, annoyance.

I. INTRODUCTION

With living standard improving, people who demand the quality of the environment is higher and is more sensitive to odor. H_2S is the principal component of odor, high toxicity, it not only damages the health of human being and corrodes equipment's, but also can be oxidized to SO_2 by oxygen and ozone, to result in acid rain and destroy our environment. Therefore, elimination of H_2S odor is in great demand in both environmental and economic aspects. Hydrogen sulfide (H_2S) is a toxic gas with a characteristic malodor of rotten eggs H_2S is rapidly absorbed by the lungs, once exposed via inhalation. A variety of industrial epidemiological studies on humans has indicated that exposure to H_2S (at high concentrations) has profound health effects on the respiratory system, which could then lead to unconsciousness with attendant neurological sequelae and, sometimes, death. It has also been associated with cardiovascular related deaths. Further, it can cause a malodor- nuisance problem even at relatively low concentrations. As a first step towards the management of this gaseous pollutant, one has to monitor its behavior in various environmental settings. To determine this noxious gas in environmental samples, gas chromatography (GC)-based

methods have been employed most frequently. These quantification methods have proved their reliability in terms of high detectability and precision. However, application of these methods is not simple, as it involves a multi-stage protocol starting from sampling and going to final determination. As such, this approach is not convenient to track down short-term variations in Behavior due to the dynamics of varying environmental conditions. Moreover, offline analytical protocols of H_2S analysis can also suffer from a number of biases (e.g., sportive loss in association with its high reactivity. Hence, it has always been a big challenge to measure H_2S accurately with the least amount of bias under field conditions. Chemical sensors have been widely used in a number of applications (e.g., critical care, safety, industrial hygiene, process control, product-quality control, human comfort controls, emissions monitoring, automotive industry, clinical diagnostics, home-safety alarms, and homeland security. For real-time monitoring of harmful pollutants that can cause a nuisance, numerous chemical sensors have been developed and employed. These sensors have mainly been based on semiconducting metal-oxide, electrochemical with both liquid and solid electrolyte) sensors, optical sensors, and sensor arrays. These sensor-based devices have shown several advantages in terms of high sensitivity, fast response, easy operation, and low cost. Depending on their material type and fabrication, their sensing principles can vary to a large extent. For example, semiconducting metal-oxide sensors mainly work on the principle of conductivity impedance, whereas electrochemical sensors rely on amperometry, potentiometric, cyclic voltammetry, and impedance measurements. However, the detection principles for optical sensors are based on observation of fluorescence- labeled systems or direct optical detection in the heterogeneous phase. To this end, most H_2S gas sensors are developed based on principles of colorimeter and spectroscopy (absorption and fluorescence). The present review is made in an effort to describe the most up-to-date features of these emerging sensor based methodologies for H_2S analysis in a practical sense. To this end, we first describe common sensor types after dividing them based on their material type and/or sensing principle. Then, we evaluate their efficacy in terms of real-world applications by comparing their quality-assurance (QA) parameters finally; we summarize these sensor-based methods and discuss them with respect to their advantages, limitations, and future prospects.





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Research Article

EFFECT OF VARIATION OF THICKNESS ON LIGHT WEIGHT FERROCEMENT PANELS: AN EXPERIMENTAL STUDY

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ABSTRACT

The Flexural strength of ferrocement panels was evaluated through laboratory investigation on flat ferrocement panels of size (550x200) mm with thickness of 20mm, 30 mm and 40mm. The mortar of 1:2.75 proportion with OPC of 53 grade and river sand of size passing through 4.75 mm IS sieve is used in this study. The water to cementitious ratio of 0.40 was maintained for all the mortars. Expanded Shape of steel Wire mesh of 1 mm thickness and opening of 15x30 mm was incorporated in the tension zone in one layer only, for this the samples were water-cured for 28 days. After that investigate the flexural strength and behaviour of ferrocement flat panels subjected to two-point loading is determined. In this study, it is observed that, the ultimate load carrying capacity of ferrocement panels goes on increasing as thickness increases. Also, the flexural strength of panel increases for 30 mm panel and decreases for 40 mm panel as compared with 20 mm ferrocement panels.

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INTRODUCTION

Ferrocement is highly versatile material containing wire mesh, cement, sand and water. The wire mesh is used as reinforcement, may be woven or welded in different shapes. It is less polluting, inexpensive, generating less wastage with attractive alternative material. This technique was used in Second World War for construction of boats. From 1960s ferrocement can be used successfully for construction of building panels. World famous Sydney Opera House was constructed by ferrocement. In India, ferrocement technique has been also used for rural development with construction of small houses, farm houses etc. [M.N. Soutsos 2009 and Y. Yorozu1982].

Conventional reinforced concrete is combination of steel bars and concrete. Shuttering and scaffolding are quite essential. Ferrocement is a composition of weld mesh, mild steel angles or bars, chicken mesh and mortar. This mixture becomes a homogenous material and can be built in conditions and in any shape. Ferrocement is a very thin material that's why it becomes light in weight nature but its ductility is very high as compared to conventional RCC. Ferrocement is defined as 'Cement mortar strongly bonded and encased in layers of fine wire meshes making it a homogeneous and ductile composite'. [Y. Yorozu1982]

Definition

"Ferrocement is a type of thin wall reinforced concrete commonly constructed of hydraulic cement mortar reinforced with closely spaced layers of continuous and relatively small size wire mesh". The mesh may be made of metallic and suitable materials. In the words of Nervi who first used the term ferrocement its notable characteristics is "Greater elasticity and resistance to cracking given to the cement mortar by the extreme subdivision and distribution of the reinforcement" [Joel Galupo Opon 2015].

Constituents of Ferrocement

The constituents of ferrocement include the hydraulic cement mortar which should be designed according to the standard mix design procedures for mortar and concrete which includes Portland cement, water, sand, wire mesh and admixtures.

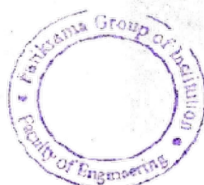
Cement: The cement should be fresh of uniform consistency and free of lumps and foreign matter and of the type or grade depending on the application.

Water: Potable water is fit for use as mixing water as well as for curing ferrocement.

Fine Aggregates: Normal weight fine aggregate clean, hard, and strong free of organic impurities and deleterious substances and relatively free of silt and clay.

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