Criteria 3- Research, Innovations and Extension

3.3- Research Publications and Awards

3.3.2 Number of books and chapters in edited volumes/books published and papers published in national/ international conference proceedings per teacher during last five year.

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BEHAVIOUR OF RC SHEAR WALL WITH AND WITHOUT OPENING USING CONCEALED BRACING

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Abstract: Shear wall is a structural element provided in multi-storeyed structures to resist wind and seismic forces which acts parallel to the plane of wall. Many times a core wall constructed around lift or a staircase acts as a shear wall. Generally, openings are provided in shear walls to meet functional requirement. Openings are also required to be provided for building services. Strength of any structural member decreases with a provision of opening in it, and it is equally true to shear walls. Provisions of reinforcement around the openings in most of the codes are found to be inadequate. As per IS 13920: 1993, around the openings of the shear walls, the area of the vertical and horizontal bars should be such as to equal that of the respective interrupted bars. However, no consideration has been given for effect of size and position of openings in shear walls. In the present work an attempt has been made to provide some practicable solution which will improve performance of shear wall during earthquake. Behaviour of RC shear wall with and without opening has been studied to know its seismic resistant and improvement in its performance using diagonal concealed braces. These concealed braces are formed by joining opposite corners of plain wall or joining corners of wall with corners of opening by diagonal reinforcement. It is found from the analysis carried using ETABS that the seismic capacity of RC shear wall increased by more than 20% under the effect of concealed braces.

Keywords: Shear wall; seismic resistance; opening; concealed brace.

INTRODUCTION:

Many buildings worldwide collapsed during strong earthquakes in recent past. Buildings with reinforced concrete (RC) shear walls have recorded several failure modes during such earthquakes (Wallace *et.al.* 2012). Most of the failures are not yet understood and many researchers suggest that there are deficiencies in the current design provisions (Wallace and Moehle, 2012). Causes of failure may be different but this yields in loss of lives and properties which ultimately affects the society. In view of improving the seismic behaviour of RC shear wall designed and detailed as per present code of practice, it is proposed to study the behaviour of such walls subjected to lateral load.

In this paper a new type of shear wall with or without opening and with concealed braces has been studied. These concealed braces are formed by joining opposite corners of plain wall or joining corners of wall with corners of opening in case of wall with opening by diagonal reinforcement. Attempt has been made to study improvement in behaviour of RC shear wall with and without opening and concealed

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Advances in Seismic Strengthening Materials and Techniques

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ABSTRACT: Seismic strengthening of reinforced concrete (RC) members is a method of improving their existing capacity to withstand seismic forces. The process typically includes strengthening of RC structural members such beams, columns, slabs, footings, beam-column junctions, etc. to improve the axial, flexure, and shear capacity. Experiences during the recent earthquakes and changes in Indian Standards made it essential to carry out structural audit of buildings. The buildings which do not comply with the recent Code provisions have to be reconstructed or to be strengthened to achieve the desired capacity level. Reconstruction of such buildings will consume time and money. Also, evacuation of such buildings for reconstruction is a difficult task. In this paper an attempt has been made to focus on the seismic strengthening of structural members of RC buildings which are designed to only gravity loads or the structures designed prior to release of new building Codes. This paper covers a brief introduction of conventional methods of strengthening followed by an introduction of advanced FRP composite materials and techniques of retrofitting for existing RC buildings. Finally, it is concluded that the advanced FRP composite materials and recent innovative methods can more advantageously used for seismic strengthening of RC buildings.

Keywords: *Reinforced concrete; technique; shear wall; seismic strengthening; FRP composite.*

1. Introduction

Most of the Italian buildings are vulnerable to seismic action even if located in areas that have long been considered of high seismic hazard as per study of Giuseppe Oliveto and Massimo Marletta (2005). Seismic strengthening is a technical provision in structural system of a building that improves the resistance to earthquake by optimizing the strength, ductility and earthquake loads. Strength of the building depends on the structural dimensions, materials, shape, number of structural elements etc. Ductility of the building is generated from good detailing, materials used, degree of seismic resistant, etc. There are several situations in which a civil engineering structure would require strengthening, retrofitting or rehabilitation due to lack of strength (axial, flexure, shear, etc.), stiffness, ductility and durability. Some of the common situations where a structure needs strengthening during its lifespan are to satisfy current code requirements, upgraded loading requirements or damage caused by accidents and environmental conditions, initial design flaws, change in usage, etc. Several techniques have been developed and also different composite materials are now in use for seismic strengthening. This paper gives an insight on FRP composite materials and other combinations used in seismic resistance of existing structure, strengthened structure, structure repaired after damage and review of research made by many researchers in regards to strength, stiffness and effectiveness. Use of FRP was studied by Asfa M et al (2010) for strengthening of shear wall with openings using different configuration of FRP around opening and found that, there is significant improvement behaviour of shear wall with opening using FRP strengthening. Different techniques of retrofit or strengthening are available but their choice depend on expected failure mode, consequences of wall retrofit, physical constraints, and budget available as investigated by Galall K. and El-Sokkary H (2008). Investigation regarding effectiveness of the externally bonded CFRP strips in improving the capacity of RC member compared to externally bonded CFRP sheets is made by Mofidi Amir and Chaallal Omer (2011). Parameter studied includes FRP rigidity, effect of FRP strip location with respect to transverse-steel location and effect of FRP strip width. It was observed that, the strength of members using CFRP strips is significantly greater than with CFRP continuous sheets. Beams strengthened with wider CFRP strips achieved greater shear strength than beams with narrower strips. Installing FRP strips midway between steel stirrups results in an increase in the maximum failure load as well as in the stiffness of the RC beam compared to installing FRP strips in the same location along the longitudinal axis as steel stirrups. New technique for the strengthening of existing RC shear walls based on the application of very thin high performance jackets is presented by Marini A. and Meda A. (2008). The results shows that, efficiency of the proposed solution is significantly increasing the structural resistance, deformation capacity, and ductility. Use of high-performance fiber-reinforced cement composites (HPFRCCs) in earthquake-resistant structures is presented by Parra- Montesinos and Gustavo J. (2005). Applications discussed include members with shear-dominated response such as beam-column connections, low-rise walls, coupling beams as well as flexural members subjected to large displacement reversals. The results presented shows that HPFRCC materials are effective in increasing shear strength, displacement

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IMPROVEMENT IN LOAD CARRYING CAPACITY OF RC SHEAR WALL WITH OPENING USING CONCEALED STEEL TUBE BRACING

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Abstract: Shear walls are provided in multistoried structure to resist lateral loads due to wind and earthquake.Openings are provided in shear walls for the purpose of functional requirement and building services. Strength of shear walls decreases due to provision of such openings because of reduction in concrete area and discontinuity in reinforcement which results in stress concentration, formation of crack around openings ultimately leading to failure. Different modes of failures of shear wall subjected to lateral load have been extensively studied and accordingly different arrangements of reinforcement are proposed by researchers. The various modes of failures can be controlled by codal provisions in IS 13920: 1993. In spite of adhering to these codal provisions while designing shear wall there are few evidences of failure reported in literature. It is not feasible to construct a shear wall which will resist every possible load but it may be possible to provide some practical solution so as to improve its behaviour to withstand major earthquake.In the present paper an attempt has been made to improve seismic resistance of shear wall with opening using concealed diagonal steel tube braces and peripheral concealed beam (stiffeners) around opening in shear wall. Analysis of shear wall with opening and provision of concealed diagonal steel tube braces and peripheral concealed beam around opening was carried out using ETABS. It was found from the analysis that the seismic capacity of RC shear wall can be improved by using concealed diagonal steel tube braces and peripheral concealed beam around opening. Increase in load carrying capacity of the shear wall model analysed was found to be 13.80%. Finally it was observed that the improvement in load carrying capacity depends on size, strength and properties of bracing, and stiffener material used for shear wall.

Keywords: *Shear wall, seismic resistance, opening, steel tube braces.*

1 Introduction

Many buildings worldwide collapsed during strong earthquakes in recent past. Even buildings with reinforced concrete (RC) shear walls have recorded several failure modes during such earthquakes. Most of the failures are not yet understood and many researchers suggest that there are deficiencies in the current design codal provisions of shear wall [14]. Causes of failure may be different but this yields in loss of life and properties which ultimately affects the society. It is not feasible and economical to construct a structure which can resist every possible earthquake force but it is possible to construct a structure which can withstand an earthquake without any danger at early stage of loading due to local failure. In shear wall local failure takes place around openings and at corners. It can be avoided by strengthening those portions. Many researchers studied behaviour of reinforced concrete wall with and without openings. Observations of failure mode, mechanism and effect of staggered opening recorded after strong earthquake shows that, shear walls with staggered openings are more seismic resistant than shear wall with regular openings. Also it was concluded that failure mechanism of shear wall with opening depends upon several factors along with opening layout [11]. The main objective of the paper is to study the effect of concealed diagonal steel tube braces and peripheral concealed beam (stiffeners) around opening in improving load carrying capacity of shear wall. In view of improving the seismic behaviour of RC shear wall designed and detailed as per present code of practice, it is proposed to study the behaviour of such walls subjected to lateral load. In this paper shear wall with opening, and concealed diagonal steel tube braces and stiffeners around opening has been studied. These concealed braces are formed by joining corners of wall with corner openings by steel square tube. Stiffeners are formed with steel square tube along periphery of opening. Attempt has been made to study improvement in behaviour of RC shear wall with opening and concealed diagonal braces and stiffeners by conducting theoretical analysis using FEM software ETABS.

2 Behaviour of shear wall

Shear walls are the lateral load resisting members in multistoried structure. Therefore, a systematic study of various parameters affecting shear wall is very important to know the performance under lateral loads. Investigations on structural behaviour such as deformation characteristics, stress distribution and dynamic characteristics are presented and discussed using software StaadPro and concluded that, deflection, distribution of stress varies with location and number of openings in a shear wall [12]. Axial force and bending moment varies with the height of shear wall. Deflection of shear wall increases when openings are introduced. Similar response was experienced in study carried out on 6 - story framed shear wall buildings with the help of

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Investigation of Fly Ash Concrete by Slump Cone and Compaction Factor Test

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Abstract. The supplementary or alternative material to cement has been an emerging field in civil engineering. The concrete ingredients have become modern due to the need for reducing global warming and material scarcity problem. Fly ash is used to replace cement partially in concrete, therefore the concrete mix has changed their characteristics as obtained by normal concrete. The proper investigation always required for performance measurement and to measure the fresh concrete property, the slump cone test, and compaction factor test are the tool. The Slump Test has become the most frequently performed due to the practicality of the recommended equipment and the experiment protocol. The slump test involves the cone's behavior under the action of gravitational forces. The slump check is a realistic way to gauge the workability. The concrete slump test and compaction factor test are used to determine the consistency of fresh concrete before it sets. This paper has focused on testing the 54 mixes having various water-cm ratios like 0.5, 0.55, 0.6, 0.45, and 0.4. Fly ash material possesses satisfactory workability properties due to their similar oxide compositions. Due to the fineness of fly ash, less bleeding observed than control concretes.

1. Introduction

As the request for foundation advancement increases, it moreover increments the possible applicability of concrete in various emerging construction activities. The need of populations and their infrastructural demand has a responsible cause of more cement consumption. In all the stages of infrastructural growth, cement manufacturing has created gigantic impacts on environmental sustainability, economy, and utilization [1,2]. Cement is the energy of worldwide infrastructure. It evaluated that the worldwide generation of cement is approximately 4200 million metric tons in 2017. With the help of innovative progress, the concrete industry always trying to find supplementary cementitious fabric in creating esteem included items conjointly decreasing the strong waste disposal issue [2]. There is a got to economize cement utilization and one of the practical solutions is to in part supplant cement with pozzolanic materials. Pozzolona may be a characteristic or counterfeit fabric containing silica in a receptive frame. It could be a siliceous and aluminous fabric, which possesses small or no cementitious esteem but in the partitioned shape, and within the nearness of dampness chemically responds with CH at standard temperatures to create natural cementitious character to the concrete. Fly ash (FA) is among the foremost unremarkably used alternative cementing material as a result of it may be act a neglected item coming about from the coal combustion[3]. The pozzolana characteristics of FA materials could

assist in decision-making. This fast explosion of fake news conjointly attracted the eye of various researchers to reason behind it and therefore to developed some tools and techniques to alleviate and find out the Rumors across on-line media as presently as potential. In this regard, the Machine Learning (ML) algorithms and Natural Language process (NLP) algorithms emerged because the remarkably important and essential tool to sight fakes news within the current age. NLP once motor-assisted with machine learning created several outstanding results that were potential simply by manual fact-checking or by traditional text detection method. We have a tendency to mention basic language of informatics and machine learning too explained in short. At last, we have a tendency to give lightweight on the longer term trends, open problems, challenges, and potential analysis bound toward informatics and ML-based approaches.

Keywords: Natural Language Processing (NLP), Machine Learning (ML), fake news.

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HUMAN EMOTION DETECTION AND STRESS ANALYSIS BASED ON EEG SIGNALS

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Abstract - Stress has become a ubiquitous emotion in people's daily life. In this paper, emotion detection is achieved using the benchmark DEAP dataset by using a new feature extraction technique called Teager-Kaiser Energy Operator (TKEO) with k-Nearest Neighbors (KNN), Neural Networks (NN) and Classification Trees (CT). Electroencephalography (EEG)-based classifier. This study evaluated the performance and accuracy of emotion detection, and since EEG showed good correlation with stress, it was further used for stress detection.

Furthermore, the current work compares the implemented TKEO feature extraction technique with relative energy ratio (RER) and kernel density estimation (KDE) techniques in terms of accuracy. This paper shows how the inclusion of TKEO improves feature extraction and represents a promising approach for emotion detection compared to other traditional techniques.

Experimental results show that TKEO provides higher accuracy than KDE and RER for stress detection in channel 1 alpha band and channel 17 beta band when used with KNN, NN, CT classifiers. Index Terms: Electroencephalography (EEG), Feature Extraction, Teager-Kaiser Energy Operator (TKEO), Neural Networks, k-Nearest Neighbors (ANN), Band Pass Filter (BPF).

Keywords: Biomarkers, Deep learning, prognosis, Neural Networks.

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DATA PROTECTION IN THE E-HEALTH ENVIRONMENT: STATE-OF-THE-ART AND FUTURE DIRECTIONS

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Abstract - E-health is poised to be the next wave of healthcare. It offers all the advantages and benefits imaginable for patients and users. However, current e-health systems are not fully developed and mature and thus lack the level of confidentiality, integrity, privacy and user trust required for widespread implementation. Two key aspects of a well-functioning healthcare company are the quality of healthcare delivery and the trust patients have in the healthcare company. Trust is intertwined with issues of confidentiality, integrity, accountability, authenticity, and identity and data management. Data protection remains one of the main barriers to successful patient trust for e-healthcare solutions, as it indirectly covers most security issues. Addressing privacy concerns requires addressing security issues such as access control, authentication, non-repudiation, and accountability, without which end-to-end

data protection cannot be ensured. From data collection in wireless sensor networks to embedding IoT into communication links and data storage and access, achieving privacy is a daunting task that requires a lot of work. Data protection requirements are further exacerbated as the data handled by companies is very personal and private in nature, and its mismanagement, whether intentional or not, can seriously damage the future prospects of patients and e-healthcare companies.

Research conducted to address privacy concerns is inherently different. It focuses on aspects of privacy that some parts of the e-healthcare enterprise fail to adequately address. In the ongoing research and implementation, the control of e-healthcare companies is gradually shifting from the organizational level to the patient level.

This is to give patients more control and decision-making power over their protected health information/electronic health records. It takes a lot of work and effort to better understand the viability of this major shift for e-healthcare companies. Existing research can of course be subdivided according to the techniques used. This includes data anonmization/ pseudonymization and access control mechanisms primarily used to protect stored data. However, this causes certain data protection requirements (accountability, integrity, non-repudiation and identity management) to take a back seat. This article provides an overview of research conducted in this area and examines whether the research offers possible solutions to patient privacy requirements for e-health services or approaches to addressing user privacy concerns (technical and psychological).

Keywords: Confidentiality, integrity, accountability, authenticity & pseudonymization.

Enhanced Ensemble Fusion Model For Stress Classification And Prediction

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Abstract. Stress has become a common phenomenon in modern society, and it has been identified as a major factor that affects people's health and well-being. Stress can be caused by various factors, such as work pressure, financial difficulties, relationship problems, and health issues. Prolonged exposure to stress can lead to physical and mental health problems, including anxiety, depression, cardiovascular diseases, and obesity. Accurate stress classification and prediction can help individuals and organizations identify the sources and levels of stress and take appropriate measures to manage stress and prevent negative outcomes. By identifying individuals who are at risk of stress, proactive interventions can be initiated to prevent negative outcomes. Additionally, stress classification and prediction can be useful for designing effective stress management programs and policies that can improve the well-being and productivity of individuals and organizations.Existing systems for stress classification and prediction have limitations in terms of accuracy and efficiency. To overcome these limitations, this paper proposes an Enhanced Ensemble Fusion (EEF)model that combines three ensemble classifiers, namely stacking, bagging, and boosting, using a blending classifier. The EEF model is composed of several classifiers, including the stacking classifier, the bagging classifier, and the boosting classifier, each using an Enhanced J48, Enhanced SVM, and Enhanced Naive Bayes classifier. An Enhanced Logistic Regression classifier is used as a meta-classifier for the stacking classifier. The model was evaluated on a Swell-EDA dataset and WESAD-EDA dataset, and the results show that it outperformed existing systems in terms of accuracy and robustness. The Enhanced Ensemble Fusion Model achieved anaccuracyof 72.86% for WESAD-EDA dataset and 50% for Swell-EDA datasetwhich is significantly higher than the accuracy of individual classifiers and existing ensemble methods. The proposed model provides a promising approach for stress classification and prediction, which can be useful in various applications, such as healthcare, human resources, and education.

Keyword : EEF, SVM, Swell-EDA, WESAD-EDA.

1. Introduction

In today's fast-paced and competitive world, stress has become a pervasive problem that is affecting individuals from all walks of life. Stress can arise from a variety of sources, including work-related pressure, financial difficulties, relationship problems, and health issues [1]. In many cases, stress is unavoidable and can be a natural response to challenging situations or events. However, when stress becomes chronic and prolonged, it can have detrimental effects on an individual's overall health and well-being [2].

Chronic stress can lead to a range of physical and mental health problems. The constant activation of the body's stress response can increase the risk of developing anxiety and depression, which can significantly impact an individual's quality of life [3]. Additionally, chronic stress has been linked to an increased risk of cardiovascular diseases such as hypertension, stroke, and heart disease [4]. This is because stress can cause the release of stress hormones such as cortisol and adrenaline, which can narrow blood vessels and increase blood pressure.Furthermore, chronic stress can also lead to unhealthy coping mechanisms such as overeating, smoking, and alcohol or drug abuse. This can result in the development of obesity, type 2 diabetes, and other chronic illnesses. Therefore, accurate stress classification and prediction are crucial for individuals and organizations to manage stress and prevent negative outcomes [5].

To effectively intervene and prevent these negative outcomes, it is essential to identify individuals who are at risk of stress.Identifying individuals at risk of stress involves understanding the factors that contribute to stress in individuals, such as their personal and environmental circumstances, genetics, and coping mechanisms. Once identified, these individuals can be provided with targeted support and interventions that aim to reduce their stress levels and improve their overall wellbeing.

Early identification of stress risk factors is also important in preventing the development of more serious health