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### Influence of Ball Material on Deformation in Non-Conforming Contact Ball Elements

**Abstract:** The life of machine element is important in industry so that the equipment is more reliable and economical in operation. Machineries invariably used rolling elements. The performance of these rolling elements depends on stress state. The deformation which is complicated in such elements depends on the type of materials used to manufacture the elements and nature of loading. The loads are in general repetitive in nature and hence the deformation becomes much more complicated. Such complicated deformation is also called as rolling contact fatigue (RCF). The state of stress is evaluated using Hertz’s stress contact theory. Such estimated stress could be used to predict deformations. The repetitive loading accompanied by Hertz’s type of contact stresses leads to complication in design in such rolling elements. The literature study showed that not much of work carried out in understanding the complex deformation due to cyclic Hertz contact stresses. In the present study a four ball test rig (ASTM D 4172 standard) was used to simulate the field conditions of the bearing element. The studies were carried out both for static and dynamic conditions. High carbon high chromium steel balls are used for static study. High carbon high chromium steel, case hardened carbon steel and stainless steel balls are used for dynamic study. Lubricant SAE 20W40 was used in dynamic test. The dynamic test was carried at a 1000 rpm at varying load levels of 50N, 100N, 150N, 300N, 500N, 700N and 900N. The experiments were conducted for a period of 30 minutes. The contact radius in case of static test and co-efficient of friction in case of dynamic test was estimated. Scanning electron micrographic studies were carried on wear scar. The wear grooves which represent the non-uniform deformations were observed to be dependent on load level and type of material. At higher load level the deformation was found to be uniform with the absence of wear grooves for all materials. In general the co-efficient of friction was found to depend on the applied normal load. There was a correlation between co-efficient of friction and state of deformation.

**Keywords:** Rolling contact fatigue, four ball tester, Hertz contact stress.

**References:**

### Image Denoising and Enhancement using Multilevel 2-D DWT Lifting

**Abstract:** In general, images are often corrupted by noise in the procedures of image acquisition and transmission. The noise may seriously affect the performance of image processing techniques. Hence image denoising and enhancement plays an important role in the field of image processing. The Wavelet Transform provides a scale based decomposition. For discrete time signals, Discrete Wavelet Transform (DWT) is implemented by two methods, the convolution method and the lifting scheme method. The basic idea is done by filtering the input signal with a low pass filter and a high pass filter and downsampling the outputs by a factor 2. The lifting scheme is an efficient method of wavelet transform and is far better than the convolution method because of its advantages like faster implementation of wavelet transform, requires lesser number of computations, allows fully in-place calculation and reversible integer wavelet transform. The lifting scheme can be applied forwardly to enhance or denoise the image and it can further be applied inversely to get back the original image. In this paper the 2-dimensional lifting based discrete wavelet transform (2-D DWT) method is implemented for image denoising and enhancement. The 2-D DWT lifting scheme algorithm has been implemented using MATLAB program for both modules. Forward Discrete Wavelet Transform (FDWT) and Inverse Discrete Wavelet Transform (IDWT) to determine the Mean Square Error (MSE) and the Peak Signal to Noise Ratio (PSNR) for the retrieved image. To implement denoising different noisy images are taken and denoised using 2-D DWT lifting scheme. The results are compared in terms of MSE, PSNR and execution time values. To verify enhancement the proposed lifting based DWT method is compared with Histogram Equalization(HE) method. The results show much more improved contrast enhancement by lifting based DWT as compare to the HE method. The parameter comparisons.
like MSE (reduced to approximately 1/10th in lifting scheme as compare to HE method), PSNR (almost doubled in lifting scheme as compare to HE method) are obtained for different images to show better enhancement using lifting based DWT method.

**Keywords:** Histogram Equalization (HE), Discrete Wavelet Transform (DWT), Mean Square Error (MSE), Peak Signal to Noise Ratio (PSNR), Lifting scheme Forward Discrete Wavelet Transform (FDWT), Inverse Discrete Wavelet Transform (IDWT).

**References:**

5. UshaBhanu.N., Dr.A.Chillambuchelvan, “A Detailed survey on VLSI Architectures for Lifting based DWT for efficient hardware implementation”, VLSICS, Volume 3, No. 2, April 2012

**Authors:** Gouri G Uppin, Mahesh N. Javalkar

**Paper Title:** Design and Simulink Implementation of 128-bit Vedic Multiplier

**Abstract:** In the calculation of real numbers, carry needs to be propagated from the least significant bit (LSB) to the most significant bit (MSB) when binary partial products are added. Thus because of this process, the addition and subtraction after binary multiplications limit the overall speed. Existing vedic multiplication is available for 8bits, 16bits, 32bit and 64 bits, proposed system is for 128bits multiplication and to increased time efficiency, with less consumption of power. Nikhilam Sutra literally means “all from 9 and last from 10”. Although it is applicable to all cases of multiplication, it is more efficient when the numbers involved are large. Since it finds out the compliment of the large number from its nearest base to perform the multiplication operation on it, larger is the original number, lesser the complexity of the multiplication. Thus, by using Nikhilam sutra it possible to multiply large numbers which is the limitation in the simple array multipliers. Nikhilam Navatashcaramam Dashatal- All from 9 and the last from 10 From the sixteen sutras available in Vedic mathematics, among them only two sutras are applicable for multiplication operation. They are Urdhva Triyakhyam Sutra (literally means vertically and cross wise) and Nikhilam Sutra (literally means all from 9 and last from 10).Vedic Mathematics provides some effective algorithms which can be applied to various application fields of engineering. Our these algorithms former proves to be a faster algorithm and applicable in all cases.

**Keywords:** Vedic Multiplicie (V M ), Radix selection unit (RSU), Exponent Determinant (E D), Mean Determinant (MD) Multiplexer ( MUX ).

**References:**

4. Toms Lang and Alberto Nannarelli, Combined Radix-10 and Radix-16 Division Unit, 978-1-4244-2110-7-2007 IEEE.
Authors: K. Selvan, M. Vanitha

Paper Title: A Machine Learning Approach for Detection of Phished Websites Using Neural Networks

Abstract: Phishing is a means of obtaining confidential information through fraudulent websites that appear to be legitimate. On detection of all the criteria, ambiguities and certain considerations involve hence neural network techniques are used to build an effective tool in identifying phished websites. There are many phishing detection techniques available, but a central problem is that web browsers rely on a black list of known phishing websites, but some phishing websites have a lifespan as short as a few hours. These websites have a shorter lifespan are known as zero day phishing websites. Thus, a faster recognition system needs to be developed for the web browser to identify zero day phishing website. To develop a faster recognition system, a neural network technique is used which reduces the error and increases the performance. This paper describes a framework to better classify and predict the phishing sites.

Keywords: Detection, Machine Learning, Neural Network, Phishing, Security.

References:
2. Efficient prediction of phishing websites using supervised learning algorithms by Santhana Lakshmi V. Vijaya MS.
4. Development of Anti-Phishing Model for Classification of Phishing Email by Niharika Vaishnav, S R Tandan.
5. Evolving Fuzzy Neural Network for Phishing Emails Detection- Ammar A. Almomani, Tat-Chee Wan.
6. Phishing Detection Using Neural Network- Ningxia Zhang, Yongqing Yuan, Freedman
10. Techniques for detecting zero day phishing websites by Michael Blasi
11. www.phishTank.com

Authors: Yugandhara S. Sontakke, V. G. Sayagavi, P. J. Salunke, N. G. Gore

Paper Title: Seismic Analysis of Multi-Storey Building on Sloping Ground

Abstract: In most of the northern earthquake prone hilly part of the India, due to local topography constraint engineered construction is resulting in the adoption of either a step back or step back & set back configuration as a structural form for buildings. The adopted form is generally irregular, torsionally coupled & hence, susceptible to serve damage when affected by earthquake ground motion. Such buildings have mass & stiffness varying along the vertical & horizontal planes, resulting the centre of mass & centre of rigidity do not coincide on various floors, hence they demand torsional analysis, in addition to lateral forces under the action of earthquakes. In this paper seismic analysis performed on 48 RC buildings with three different configurations like, Step back building, Step back Set back building and Set back building are presented. 3 – D response spectrum analysis including torsional effect has been carried out by considering the dynamic response properties i.e. fundamental time period, top storey displacement and, the base shear action induced in columns with reference to the suitability of a building configuration on sloping ground. It is observed that Step back Set back buildings are found to be more suitable on sloping ground.

Keywords: Building, Etab, Response Spectrum Analysis, Seismic, Sloping ground.

References:
5. “Seismic Analysis of Buildings Resting on Sloping Ground with Varying Number of Bays and Hill Slopes” by Dr. S. A. Halkode, Mr. M. G. Kalyanshettu.,
6. “Effect of Sloping Ground on Step- Back and Setback Configurations of R.C.C. Frame Building” by Chaitrali Arvind Deshpande & Prof. P. M. Mohite.
7. “A Review on Seismic Analysis Of a Building on sloping ground” by Sanjaya Kumar Patro, Susanta Banerjee, Debasnana Jena, Sourav Kumar Das.
8. “Seismic performance of buildings resting on sloping ground-A review” by Hemal Dr. R. B. Khadrianaikar and Arif Masali.
10. “Dynamics of Structures” by A.K.Chopra
11. “Earthquake Resistant Design of Structures’ by Shashikant K Duggal
14. Explanatory Examples on Indian Seismic Code IS 1893 (Part I) by Dr. Sudhir K Jain (IITK-GSDMA)

Authors: M. A. Kounain, Z. Khan, F. Al-Sulaiman, N. Merah

Paper Title: Low Velocity Impact Damage Analysis in Plain Weave Woven GFRP Laminates Through Optical and SEM Microscopy

Abstract: In the present study, instrumented drop weight impact tests at different impact energies were performed to investigate the modes and mechanisms of the low velocity impact damage in plain weave woven glass fiber reinforced plastic (GFRP) composite laminates. 8-ply, 16-ply, 24-ply and 32-ply laminates having identical 0° layup were examined via optical and scanning electron microscopy after free falling weight single bounces. It was found that under low velocity impact the failure was initiated by matrix cracking at the interstitial region of 0° GFRP composite laminates. These matrix cracks were much extensive in 8-ply laminates as compared to laminates with larger number of plies. These matrix cracks propagate to cause fiber fracture and fiber matrix debonding and extend across the thickness of the laminate to introduce delamination. The eventual failure thus occurs through the combination of matrix cracking, fiber fracture, fiber matrix debonding and delamination.

Keywords: Low Velocity Impact, GFRP Laminates, Damage Characterization, Optical and SEM Microscopy

References:

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Paper Title: Role of Hardness on Abrasive Wear Modes in a Three Body Wear

Abstract: In thermal power plants, fluid slurry conveying and other industrial applications where material is conveyed, the hard materials will be in-contact with parts of conveyors. The surfaces of piping and pumps surfaces come in contact with hard particles. The mill components like grinding ring, grinding balls and other components of the mill are exposed to different hard particles. In all the above the common feature is ‘two bodies’ which are in contact while transferring load and displacement from one object to other object. Apart from many are also exist, relative motions between the two objects. This type of loading and dynamic conditions gives rise to elastic, inelastic and surface damage of both the objects, This causes damage of machinery equipment which affects the efficiency of a machine and in extreme conditions leading to breakdown of machines. In the present investigations experiments have been conducted to understand basic wear mechanisms that will be prevailing when hardness of the material varies. For simulating the field conditions rubber wheel abrader test is used for conducting experiments. Mild steel (130.9 BHN heat resistant steel (155.6 BHN) High carbon high chromium steel (158.2 BHN) and cast iron (159.3 BHN) were used as target materials. Commercially available sand was used as abrader. Experiments were conducted with two normal loads 53.2 N and 102.4 N. The speed was maintained at 200 rpm. The time of test has 6 minutes, the flow rate was 100 grams/min. The wear loss was estimated and found that wear loss for mild steel and heat resistant steel are comparable which are 0.41 and 0.29 at a load of 53.2 N and 0.82 and 0.57 at a load of 102.4 N. The wear loss was estimated and found that wear loss for high carbon high chromium steel and cast iron of 0.08
and 0.04 at a load of 52.3 N and 0.16 and 0.06 at a load of 102.4 N which is again comparable.

Keywords: 130.9 BHN heat resistant steel (155.6 BHN) High carbon high chromium steel (158.2 BHN) and cast iron (159.3 BHN), 102.4 N.

References:
3. Hirst, W.1957, in proceedings of the conference on lubrication and wear, ImechE, London, 674

Authors: Sanjivyan Mahadik, S. R. Bhagat

Paper Title: USE of Composite Materials in Seismic Retrofitting of RC Shear Wall

Abstract: A majority of the structures throughout the world are constructed of reinforced concrete. Reinforced concrete has good compressive strength but it shows brittle failure at joints or connections when subjected to bending moment due to seismic load. Some seismic load resisting system is essential to minimize the effect of seismic load to avoid failure of structures. The most common lateral load resistance systems found in many reinforced concrete structures is shear walls. Shear walls have been widely accepted as effective alternatives to moment resistant frames in seismic design of concrete structures. The main purpose of providing shear walls is to resist wind and earthquake forces in addition to gravity force. Many existing buildings which have been constructed without proper provisions of seismic resisting aid but these structures have RC walls around the stair blocks and elevator or along the structure perimeter. These elements are often reinforced to resist the vertical loads only, without considering the seismic actions. In few cases, the elements may be reinforced to resist horizontal wind loads but this provided reinforcement may be insufficient and effective against the design seismic actions recommended by the latest standards. In order to transform the existing RC walls into seismic resistant shear walls, different retrofit materials and techniques are traditionally proposed. Several composite materials have been tried by researchers to improve the behaviour of concrete used in different structural members and shear walls to improve their strength either for retrofitting or repair. Transformation of the existing RC walls into anti-seismic shear walls is often preferred due to simplicity and having no drawbacks. Structural members including shear wall requires retrofitting or repair due to change in codal provisions or changes in structure due to functional requirement or due to other reason. Several composites available in market can be easily utilized for the purpose with different technique. This paper covers review of these methods and technique used in retrofitting RC shear wall.

Keywords: composite materials, seismic retrofitting, base isolation, strength, stiffness, ductility

References:
12. H. El-Sokkary & K. Galal, “Cyclic Tests on FRP-Retrofitted RC Shear Wall Panels”,15 WCEE LISBOA 2012Department of Building, Civil and Environmental Engineering, Concordia University, Montreal, Quebec, Canada. 1-9
32. Earthquake Resistant Design of structures by Pankaj Agarwal Manish Shinkhade: PH Learning privet limited.
33. Learning materials on internet.nptel.ac.in by Prof. P. C. Pandey, Dept. of civil Eng., II Sc Bangalore (2014).

Authors: Pallavi Bhole, P.J. Salunke

Paper Title: Analytical Study and Design of Diagrid Building and Comparison with Conventional Frame Building

Abstract: The diagrid structural system has been widely used for tall buildings due to the structural efficiency and aesthetic potential provided by the unique geometric configuration of the system. In present work, concrete diagrid structure is analyzed and compared with conventional concrete building. Structural design of high rise buildings is governed by lateral loads due to wind or earthquake and its resistance is provided by interior structural system or exterior structural structure. Due to inclined columns lateral loads are resisted by axial action of the diagonal in diagrid structure compared to bending of vertical columns in conventional building. A regular five storey RCC building with plan size 15 m × 15 m located in seismic zone V is considered for analysis. STAAD. Pro software is used for modelling and analysis of structural members. All structural members are designed as per IS 456:2000 and load combinations of seismic forces are considered as per IS 1893(Part 1): 2002. Comparison of analysis results in terms of storey drift, node to node displacement, bending moment, shear forces, area of reinforcement, and also the economical aspect is presented. Drift in diagrid building is approx. half that obtained in conventional building. Steel consumed in diagrid building is 33.21 % less as compared to conventional frame.

Keywords: Diagrid building, conventional building, storey drift, economy, seismic forces

References:
4. G. Davenport, “the response of six building shapes to turbulent wind”, seria a, mathema.
10. Ali, m.m. (2001). Art of the skyscraper: the genius of fahzur h nr. new york: nizzoli.

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Paper Title: Review on Direct Shift Gearbox

Abstract: At the time of launch in 2003- DSG became the world’s first dual clutch transmission in a series.
production car, in the German-market. Automatic gear boxes are becoming popular today in most of the vehicles due to number of benefits like high efficiency, better fuel economy, smoother operation, consistent downshift time etc. Direct shift gearbox is one of them. By using two independent clutches, a DSG can achieve faster shift times,[2][3] and eliminates the torque converter of a conventional epicyclic automatic transmission.[2] This paper gives detailed insight into the different features of DSG i.e. variations, controls, operation, advantages applications and why its use should be encouraged.

**Keywords:** DSG controls, ECU, Operation, Upshift.

**References:**
1. Volkswagen Service Training Manual 308 - 02E 6-speed DSG
8. ETKA
9. Volkswagen Service Training Manual 390 - 0AM 7-speed DSG
11. www.carwow.co.uk

**Authors:** S. Gopi Prasad, B. Shankar

**Paper Title:** Restoration of Tanks in Bangalore Metropolitan Area: Issues and Guidelines

**Abstract:** Bangalore Metropolitan Area, India, is characterized by the integral presence of water bodies (Lakes/tanks) both manmade and natural, with over 400 in total and with over 90 tanks within the metropolitan area and City corporation limits respectively. The city has witnessed unprecedented growth at 3.25 % in the previous decade, while registering a 4.46 % annual growth rate in the past decade. The growth has led to a sprawl and led to indiscriminate use of land, encroachment of water ways/water bodies. The neglect by the authorities coupled with the letting of the sewage and waste water into the water courses have led to environmental degradation and loss of resources. Over the past decade, there have been series of policy and practice interventions adopted by the Government leading to the conservation and rejuvenation of the tanks with varied success. The efforts have been to direct the interventions to serve: better land use management and integration of open spaces. This being tackled through the formal land use plan documents such as the Master plan and protection from encroachments through use of legal instruments; better storm water management allowing the tanks to act as detention ponds and prevent flooding; integrating the tanks with the urban water supply system with provision of utilizing the tanks for storage of re-cycled water and supply reservoirs and improvements to surrounding urban environment and urban ecology/ bio diversity. The paper review various interventions by highlighting the significant results accrued and provides important directions for the strengthening the interventions with a mix of regulatory, ecological, technical and financial parameters at various levels through institutions.

**Keywords:** Tanks, Restoration, land use, management Policy Guidelines.

**References:**

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**Paper Title:** Spatial Data Infrastructure for Metropolitan Bangalore: Opportunities and Challenges

**Abstract:** The Spatial Data Infrastructure (SDI) at the metropolitan level is described as the “implementation of a framework comprising of geographical data, the technology, human resources, Policies and standards”. The objective is to allow the use of spatial data in an efficient and flexible way for the identified stakeholders in the Metropolitan area to achieve the better planning and city management. The Bangalore Development Authority (BDA) had initiated the implementation of the Metropolitan Spatial Data Infrastructure (MSDI) within the jurisdiction of Bangalore Metropolitan Area early 2003. The overall goal of the initiative was to enable BDA to effectively carry out urban planning, assist in decision making, regulation and enforcement, as well as to host the spatial data for other stakeholders, by becoming a nodal base mapping agency or centre. The formal implementation of the initiative has been in co-terminus with the approval of the Revised Master Plan 2015 in the year 2007. Subsequently, there were various additional initiatives that have been taken up based on the needs of BDA and other Stakeholder. The paper traces the important follow-up initiatives for implementation of MSDI by...
illustrating cases. An attempt is made to highlight the opportunities and challenges for effective of metropolitan spatial data infrastructure as a platform for all the stakeholders.

**Keywords:** Spatial Data, Infrastructure, Metropolitan, Land Use, Water Bodies

**References:**
13. www.esri.com/sdi
15. www.csdila.unimelb.edu.au
17. www.elsevier.com/locate/cities