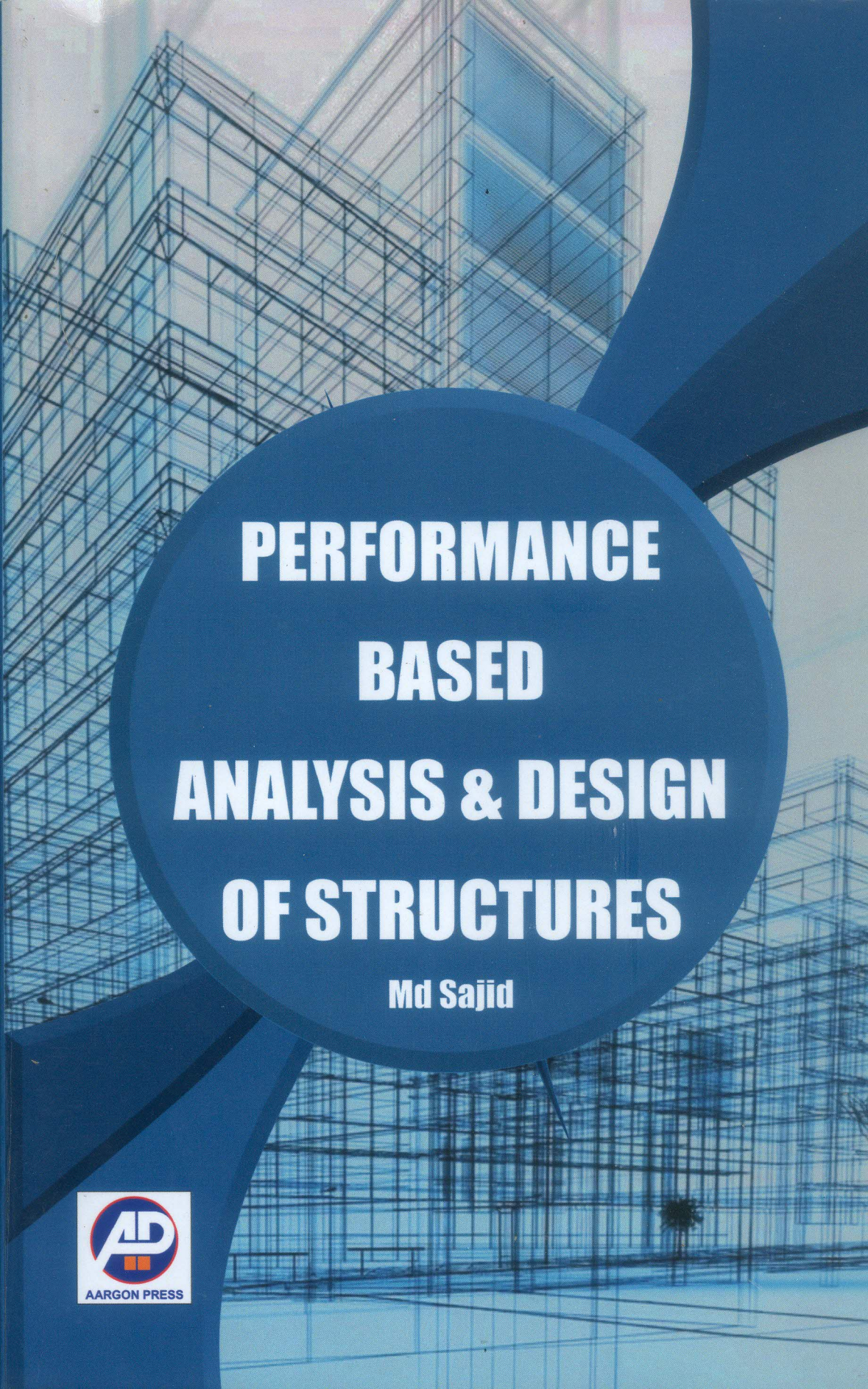

PERFORMANCE BASED ANALYSIS & DESIGN OF STRUCTURES

Md Sajid

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Performance Based Analysis & Design of Structures

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Feasibility and Acceptability of Tensegrity as Transmission Tower

Tabish Izhar & Ashish Srivastava, Department of Civil Engineering, Integral University, Lucknow (U.P.), India

The present work is to portray the applications of tensegrity structures as Electrical Transmission Tower. The study focuses on the design and analysis of the considered tensegrity Structure with triangular formwork system using STAAD Pro V8i and comparing it with that of a conventional Steel Transmission Tower in shape, size, weight and other physical properties. The analysis shows that due to the tensile properties very less weight of tensegrity tower was required to attain the required stiffness. The weight of tensegrity tower was almost one third than that of conventional. Additionally they are also checked for future expansion in the height of the tower for change on conditions and increase of loads and tensegrity tower showed more susceptibility to it than the conventional steel towers. The towers were checked for different sections such as pipe section and angle sections and the economical section for both the towers were opted. The towers were designed and analyzed for the worst broken wire condition. There were total seven conditions as it was the three-wire circuit. The research showed great possibilities for the development of the tensegrity tower for electrical transmission. This is very beneficial for developing countries like India, as demand for electric supply is increasing yearly for cities and villages. In such scenario, an effective, quick and economical approach is required.

Computer Aided Optimization of Concrete Tapered Beam Section Used in Peb

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A beam is a structural element and it can be able to withstand load predominately by resisting the bending. Beams can be categorized into different classes depending on different attributes such as shape of cross-section, geometric profile, boundary conditions etc. Beams are one of the common types of structural components and they are fundamentally categorized as Uniform and non-uniform beams. The non- uniform beam has the benefit of better distribution of strength and mass than uniform beam this leads to the utilization of non-prismatic rigid frames with slender elements. Tapered beam is a type of non-uniform beam that has different dimension at the end of the beam and the mid-span. End of tapered beam has a larger dimension than the middle span. The concept of tapering of beam comes from pre-engineered structure. This work elaborates and investigates the pre-engineered buildings with tapered sections.

Engineered Buildings (PEB) are nothing but steel buildings in which excess steel is avoided and fabricated in factory The buildings were pre-engineered because, like their ancestors, they relied upon standard engineering designs for a limited number of off- the-shelf configurations. The main concept of PEBs is optimizing material usage and reducing the total weight of the structure by matches the shape of

Direct Displacement Based Design Procedure for Seismic Designing of Reinforced Concrete Buildings

Saumya Shukla, Tabish Izhar & Mohd. Kashif Khan Department of Civil Engineering, Integral University, Lucknow (U.P.), India

Earths signs of ageing due to stress because of the selfish human activities are pretty ugly. The drastic changes occurring in our environment leading to several disastrous events due to shifting of tectonic plates i.e. frequent occurrences of earthquakes leading to loss of life as well as economy and thus proving the conventional structural design techniques flawed and incompetent. Hence, construction techniques working in harmonious combination of life safety and economy shall be adopted, a technique that is concerned with what a building is required to do, and not with prescribing how it is to be constructed. This paper aims to provide a brief introduction of a performance based design methodology i.e. direct displacement based design (DDBD) procedure, deficiencies in conventional force based design procedure (FBD) which cannot be overlooked anymore and which is why a shift from FBD to DDBD is the need of the hour. The main objective of this thesis is to do a comparative study of performance based seismic design (DDBD) and conventional design (FBD) approach, applied on a irregular tall building using non-linear dynamic analysis technique (time history method), to compare seismic behavior of multistoried RC framed building for different earthquake intensities in terms of various responses such as, base shear and displacements and to find the relationship between earthquake intensities and their responses.

Analytical Study on Mooring of Floating Offshore Structure

Halima Naaz & Tabish Izhar, Department of Civil Engineering, Integral University, Lucknow (U.P.), India

In this research work, the analytical study of the mooring system in the floating offshore structure, the main purpose of this research work is that, which cable arrangement is more stable in the floating offshore structure. Due to global warming, the glacier starts melting due to which in the future the ground surface is covered with the water which melts from the glacier. In that condition, we cannot construct the RCC structure for survival so we should construct the floating structure. In this research work, a floating structure is arranged with the 4 and 6 cables. The height of the wave is considered on the floating structure are 1.5m, 2m, and 3m. The model is created with the help of the CATIA software and analyzed with the help of the Ansys software. The calculation of the total weight of the floating structure is done manually for checking the stability of this floating structure. The Staad pro software is used for the determination of the weight of the column and beam of this floating house. The material used for the construction of the beam, column, and slab is lightweight aggregate, for the wall is carbon fiber composite panel and for the pontoon is Expansive polystyrene. The diameter of the cables are 50 mm and 60mm for each 4 and 6 number of the cable in the floating offshore structure. There are

An Experimental Study To Analyse the Effect of Using Glass Fibre Reinforced Polymer (GFRP) Bars as Main Reinforcement in Beams and Columns

Qadir Raza & Tabish Izhar, Department of Civil Engineering, Integral University, Lucknow, UP, India

In this study, beams measuring 150 mm wide x 150 mm deep and 700 mm length were reinforced and casted with 10 mm diameter steel bars, Plain surfaced Glass Fibre reinforced Polymer (GFRP) bars and ribbed surfaced GFRP bars. Out of the nine Beams, three were casted with plain surfaced GFRP bars, three with ribbed surfaced GFRP bars as per American Concrete Institute (ACI- 440) and the remaining three with steel bars as per detailing obtained by IS 456: 2000 – plain and reinforced concrete code of practice. Similar approach was conducted in case of columns. All the beams and columns were provided with 8 mm diameter steel stirrups. The beams and columns were tested after 28 days of curing period. The beams were tested for flexural strength and deflection under two point loading test from flexural testing machine while columns were tested for compressive strength under compression testing machine of capacity 3000 kN. The performance of beam and column specimen was analysed with reference to the important parameters like reinforcement material type (GFRP and Steel) and concrete compressive strength. It was comprehensively noted that ribbed GFRP bars in columns showed better performance than steel bars reinforced columns considering the appearance of initial cracks.

Analytical Study of Tied Arch Bridge

Altamash Ali & Tabish Izhar, Department of Civil Engineering, Integral University, Lucknow (U.P.), India

The proposed work investigate the structural behavior of tied arch bridge by varying Arch Rib Angle and rise when the bridge is subjected to static and vehicle loading A Tied arch bridge is a bridge made from materials such as steel or reinforced concrete. An arch is a pure compression form by using the CSI civil-engineering software SAP2000 to establish the model. In this paper we investigate the effects shape of the arch to rise ratio of Rib on the deflections, internal stresses, bending moment and shear force also Find out the weight of all bridge models and compare them with each other to find the optimum weight.

Tied Arch bridges are highly appreciable appearance and significantly utilized structural materials; tied arch bridges have been taken as one of the most popular types of bridges in last decades and have been successfully built all around over the world. The main structural components of tied arch bridge are arch rib, hangers, and main girder. Arch ribs are curved type member made up of steel or concrete depending on the designer. The shape of arch ribs is parabolic or circular. Hangers are made up of steel and attach to arch rib and main girder. Main girder is made with steel or sometimes with concrete. Hangers are attaching with arch ribs and main girder to transfer the load from girder to ribs. As the loads pushes down the deck downwards it creates a tension force in hangers that are anchored to both girder and

A Comparative Study on Carbon Fiber Bar and Steel Bar in Axially Loaded Reinforced Concrete Column

Aarushi Nigam & Zishan Raza Khan, Department of Civil Engineering, Integral University, Lucknow (U.P.), India

Corrosion and its management has long been a worry for civil engineers, so we've developed various alternatives such as carbon fiber reinforcement polymer (CFRP), glass fiber reinforcement polymer (GFRP), and aramid fiber-reinforced polymer (AFRP) (AFRP). We are most interested about carbon fiber reinforced polymer bar, which is not only lighter than steel or GFRP, but also corrosion resistant, fatigue resistant, tensile strength, and electric and magnetic resistance, all of which are advantageous in constructions where interference is unwanted. CFRP bar is also stiffer than any other polymer, hence it has a higher ultimate capacity than any other polymer. Carbon fiber is usually used in the same way that it is in a matrix. Although epoxy or polyester resin is commonly used in pole and vessel construction, carbon fiber is also used as a reinforcement material in thermoplastics, concrete, and ceramics. The experiment will feature 24 rectangular reinforced columns with a cross section of 100mm x 100mm and a height of 500mm. The specimens that were tested were sorted into four groups. Six examples with CFRP bar, longitudinal reinforcement of three specimens (4 no. 4mm diameter) and three specimens (4 no. 5mm diameter), transverse steel 6mm @ 100mm dispersed throughout all specimen lengths, and f_{ck}=25N/mm2 are found in

Use of Waste Rubber Tires with Steel Fiber in Concrete

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The effective way of disposing the used tires is by reusing them in construction industry in an environmentally friendly manner. Experiments were conducted to determine how the properties of the concrete were affected by the inclusion of waste tires. Waste tires were used in the form of chips and fibers. There was a noticeable decline in the compressive strength of the concrete. The study also tries to point out the fact that not all discarded materials classified are waste but can be converted to other uses by manipulating its form to suit the desired use. In this case, cut rubber tire particles that can no longer be used by vehicles nor re-threaded for further use. Adding them as partial or complete substitutes for gravel with steel fiber in concrete mixes, cut rubber tire particles could lower cost of production and saving valuable funds and resources to be used for construction projects.

There is an urgent needto find effective ways of disposing the used tires by reusing them in an environmentally friendly manner. One such possible way is to use the waste tires for the construction industry in the form of Tattered Rubber (TR) or Crumb Rubber (CR) components which can be mixed with concrete as an aggregate of filler. Although concrete is the most popular construction as an aggregate or filler. Although concrete is the most popular construction material, it has some limitation in properties like low tensile strength, low ductility, low

Experimental Study of Various Shaped Isolated Footings under Monotonic Loading on Pond Ash

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The study explores the load-settlement behavior of the four different shaped footing (Square, circular, rectangular, and triangular) specimens under monotonic loading. For this purpose, footing specimens of surface area 150cm^2 with plate thickness 8mm was taken and choosing their dimension accordingly. They are studied under pond ash. The monotonic loading tests were conducted on all the specimens and load intensity v/s settlement curves are plotted. For this, a tank of size 45cm x 45cm x 45cm was filled up to 30cm in 3 layers of 10cm by pond ash. By applying load for the same settlement, it was found that the load required for the square footing specimen is more than other footings for the same settlement and triangular footing specimen takes lesser load for the same settlement. Means the load carrying capacity of square footing specimen is higher than the other specimens. Curves were plotted between settlement and load intensity which shows the results very clearly of their respective footing specimens. The load intensity – settlement behavior was also checked for loamy soil and pond ash being put into alternate layers of 8cm depth, pond ash being at bottom and soil at the top. The results were similar to simple pons ash.

Pond ash, the by-product of thermal power plants is considered as solid

Study of Modulus of Elasticity of RC Beam under Flexural Loading Using ANSYS

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With the recent advancement in the structural design of concrete structure it has become very essential to know the elastic properties of reinforced concrete rather than using elastic property of plain concrete in which only cross area of plain concrete is taken into consideration whereas the effect of reinforcement bars and tie bars which confines concrete are not considered. As per the current IS: 456-2000 codal provisions the modulus of elasticity of concrete is expressed as a function of grade of concrete. The aim of this study is to determine Modulus of Elasticity of Reinforced Concrete by non-linear Finite Element Analysis (model size 250 x 300 x 4800 mm) with different grades of concrete (M20, M25, M30) and percentage of tension reinforcement varying from 0.54 to 1.26% using ANSYS.

Reinforced concrete is one of the most important building materials and is widely used in many types of engineering structures. The economy, the efficiency, the strength and the stiffness of reinforced concrete make it an attractive material for a wide range of structural applications. The ultimate objective of the designer is to create a structure that is safe and economical. The safety and serviceability assessment of the structures necessitate the development of accurate and reliable methods and models for their analysis. The rise in cost of materials used in structures and labour costs encourage engineers to seek more economical