Multi Storey Precast Concrete Framed Structures 2nd Edition

Hybrid Simulation deals with a rapidly evolving technology combining computer simulation (typically finite element) and physical laboratory testing of two complementary substructures. It is a cost effective alternative to shaking table test, and allows for the improved understanding of complex coupled systems. Traditionally, numerical simulation an

Precast concrete design, manufacture and construction is carried out to the highest standards of exactness--and yet much of the knowledge is restricted to the precast industry itself. Hence there is a need for a comprehensive reference work for structural engineers and architects. This book provides just such a work, covering the design, detailing and construction of precast skeletal structures. Architectural matters, such as integrated structural building facades, are explained against a background of recent case studies. Structural design methods featured include frame and component analysis, precast floors, composite construction, diaphragm action, connections and frame stability. There are also chapters on design for robustness and temporary stability during frame erection. The text contains state-of-the-art information, together with numerous worked examples borne out of the author's many years of practical experience in precast concrete design and construction. These include the preliminary design of a four story structure, and over 14 problems in connection design alone.

Precast reinforced and prestressed concrete frames provide a high strength, stable, durable and robust solution for any multi-storey structure, and are widely regarded as a high quality, economic and architecturally versatile technology for the construction of multi-storey buildings. The resulting buildings satisfy a wide range of commercial and industrial needs. Precast concrete buildings behave in a different way to those where the concrete is cast in-situ, with the components subject to different forces and movements. These factors are explored in detail in the second edition of Multi-Storey Precast Concrete Framed Structures, providing a detailed understanding of the procedures involved in precast structural design. This new edition has been fully updated to reflect recent developments, and includes many structural calculations based on EUROCODE standards. These are shown in parallel with similar calculations based on British Standards to ensure the designer is fully aware of the differences required in designing to EUROCODE standards. Civil and structural engineers as well as final year undergraduate and postgraduate students of civil and structural engineering will all find this book to be thorough overview of this important construction technology.

Since the 1980’s, several buildings throughout the world have been subject to gas explosions, impact by cars or airplanes, or car bomb attacks. In many cases the effect of the impact or explosion has been the failure of a critical structural member at the perimeter of the building. After the failure, the load supported by that member could not be redistributed and part or all of the structure has collapsed in a progressive manner. The phenomenon that occurs when local failure is not confined to the area of initial distress, and spreads horizontally and/or vertically through the structure, is termed progressive collapse. Progressive collapse is a relatively rare event, as it requires both an accidental action to cause local damage and a structure that lacks adequate continuity, ductility, and redundancy to prevent the spread of damage. It is technically very difficult and economically prohibitive to design buildings for absolute safety. However it is possible to construct precast concrete buildings that afford an acceptable degree of safety with regard to accidental actions. A structure is normally designed to respond properly, without damage, under normal load conditions, but local and/or global damages cannot be avoided under the effect of an unexpected, but moderate degree of accidental overload. Properly designed and constructed structures usually possess reasonable probability not to collapse catastrophically under such loads, depending on different factors, for example: the type of loading; the degree and the location of accidental loading in regard to the structure and its structural members; the type of structural system, the construction technology, and the spans between structural vertical members, etc. No structure can be expected to be totally resistant to actions arising from an unexpected and extreme cause, but it should not be damaged to an extent that is disproportionate to the original cause. The aim of fib Bulletin 63 is to summarize the present knowledge on the subject and to provide guidance for the design of precast structures against progressive collapse. This is addressed in terms of (a) the classification of the actions, (b) their effect on the structural types, (c) the strategies to cope with such actions, (d) the design methods and (e) some typical detailing, all supplemented with illustrations from around the world, and some model calculations.

This comprehensive code comprises all building, plumbing, mechanical, fuel gas and electrical requirements for one- and two-family dwellings and townhouses up to three stories. The IRC contains many important changes such as: An updated seismic map reflects the most conservative Seismic Design Category (SDC) based on any soil type and a new map reflects less conservative SDCs when Site Class A, B or D is applicable. The townhouse separation provisions now include options for using two separate fire-resistant-rated walls or a common wall. An emergency escape and rescue opening is no longer required in basement sleeping rooms where the dwelling has an automatic fire sprinkler system and the basement has a second means of egress or an emergency escape opening. The exemption for interconnection of smoke alarms in existing areas has been deleted. New girder/header tables have been revised to incorporate the use of #2 Southern Pine in lieu of #1 Southern Pine. New tables address alternative wood stud heights and the required number of full height studs in high wind areas.

A comphensive guide to information sources relevant to the building industry and legislation affecting it. It is designed for use as a tool either in the office or on site, giving facts in a compendium style to meet the most common requirements of the busy builder.

Countless lives have been saved as a result of recent strides in earthquake engineering and related sciences. This trend has been furthered by the work of the Canadian national Committee on Earthquake Engineering which has, over the past twenty years, provided specialists with a forum for exploring new approaches to the problem. Engineers, scientists, researchers, geologists, seismologists, and other professionals have shared research and experience at the committee's conferences. The sixth of these, held in June 1991, is documented in this volume. Three keynote papers provide the overall focuses for the volume. Each deals with one of the three major areas in the field: structures, in a paper on design developments in high-rise design and construction in Japan; geotechnical engineering, in a discussion of the effects of site conditions on ground motions; and seismology, in an account of the development of phased strong-motion time-histories for structures with multiple supports. Shorter papers fall into three broad areas: response analysis and design of structural components; the interaction of seismicity, mitigation, soil response, and social structure; and seismic codes and structures. This conference, along with other similar events throughout the world, has contributed significantly towards understanding various phenomena needed for building safe, reliable, and economical structures that can meet the challenges presented by the forces of nature.

This second edition of Precast Concrete Structures introduces the conceptual design ideas for the prefabrication of concrete structures and presents a number of worked examples of designs to Eurocode EC2, before going into the detail of the design, manufacture, and construction of precast concrete multi-story buildings. Detailed structural analysis of precast concrete and its use is provided and some details are presented of recent precast skeletal frames of up to forty stories. The theory is supported by numerous worked examples to Eurocodes and European Product Standards for precast reinforced and prestressed concrete elements, composite construction, joints and connections and frame stability, together with extensive specifications for precast concrete structures. The book is extensively illustrated with over 500 photographs and line drawings.

Building with precast concrete elements is one of the most innovative forms of construction. This book serves as an introduction to this topic, including examples, and thus supplies all the information necessary for conceptual and detailed design.

V. 1. Principles. Roof and floor units. Wall panels.--v. 2. Industrial shed-type and low-rise buildings; special structures.--v. 3. Multi-storey industrial and administrative buildings. School and university buildings. Residential buildings.

Connections are among the most essential parts in precast structures. Their performance relates to the structural limit states, as well as to manufacture of the precast elements and erection and maintenance of the structure itself. Proper design of connections is one major key to a successful prefabrication. The principal aim of fib Bulletin 43 is to encourage good practice in the design of structural connections in precast concrete structures. This is achieved through a good understanding of structural connections as parts of the overall structural system and of basic force transferring mechanisms. The bulletin consists of two parts; the first part concerns general considerations and philosophy in the design of structural connections, and the second part deals with basic force transferring mechanisms within structural connections. The main focus is on the design of structural connections with regard to their structural function in ordinary design situations in the serviceability and ultimate limit states, and in accidental/abnormal design situations, like fire, lack of fit and impact/accidental loads. Other aspects considered include production, handling and site erection of elements, building physics, durability and maintenance. Bulletin 43 applies to structural connections for precast concrete buildings, although the information on basic force transfer mechanisms can also be applicable to other types of prefabricated structures.

Concrete will be the key material for Mankind to create the built environment of the next millennium. The requirements of this infrastructure will be both demanding, in terms of technical performance and economy, and yet be greatly varied, from architectural masterpieces to the simplest of utilities.Concrete durability and repair technology forms the Proceedings of the three day International Conference held during the Congress, Creating with Concrete, 6-10 September 1999, organised by the Concrete technology Unit, University of Dundee.

A construction material that once was innovative and modern and then fell somewhat into disrepute through some of the quite radical post-war architecture, concrete is today very popular with planners and builders due to its multifaceted nature. The material offers enormous potential through its extensive load-bearing capacities but also due to the diversity of its properties and surface characteristics. In addition to the technical possibilities customarily attributed to concrete construction, the construction material is on the ascendant not least due to the current debate regarding energy efficiency and sustainability, since it seems tailor-made for the realization of the relevant requirements. It is not just the design and construction of concrete load-bearing structures that are the focus of this publication, but also the materiality and thus the haptic and sensuous side of the material in particular. That's because visible concrete in "smooth gray flawless" quality is not everything that concrete has to offer. Even designers and interior decorators develop furniture and space innovations of unimagined sensuality. The Modern Concrete Construction Manual provides the planner with well-founded expert information regarding the construction material of concrete, ranging from manufacturing to materiality to the design of concrete load-bearing structures, including current options for digital design and production processes. As a standard reference volume, the publication offers comprehensive and detailed insights regarding topics including cost-effectiveness, energy and sustainability, renovation, design and interior decoration. An extensive index of works with successful real-life examples provides inspiration and invites the reader to make modern use of a classical construction material.

Offers the latest regulations on designing and installing commercial and residential buildings.

Concrete-design and build with the construction material of the future With its virtually infinite plasticity, its constructional versatility, and its simple and straightforward building technology, concrete is the building material of the present. In addition to careful design and constructional planning, the invitation of bids and the building contract are the keys to a successful implementation. Building with Concrete provides the basic information needed to work with the material, with special attention to the architect’s role in planning and construction management. It describes current trends in concrete technology and the development of innovative new types of concrete, with firsthand reports by architects in the field. It also describes the new version of the DBV/BDZ data sheet "Exposed Concrete."

Multi-Storey Precast Concrete Framed StructuresJohn Wiley & Sons

Precast reinforced and prestressed concrete frames provide ahigh strength, stable, durable and robust solution for anymulti-storey structure, and are widely regarded as a high quality,economic and architecturally versatile technology for theconstruction of multi-storey buildings. The resulting buildingssatisfy a wide range of commercial and industrial needs. Precastconcrete buildings behave in a different way to those where theconcrete is cast in-situ, with the components subject to differentforces and movements. These factors are explored in detail in thesecond edition of Multi-Storey Precast Concrete FramedStructures, providing a detailed understanding of theprocedures involved in precast structural design. This new editionhas been fully updated to reflect recent developments, and includesmany structural calculations based on EUROCODE standards. These areshown in parallel with similar calculations based on BritishStandards to ensure the designer is fully aware of the differencesrequired in designing to EUROCODE standards. Civil and structural engineers as well as final year undergraduateand postgraduate students of civil and structural engineering willall find this book to be thorough overview of this importantconstruction technology.

Hybrid Composite Precast Systems: Numerical Investigation to Construction focuses on the design and construction of novel composite precast frame systems that permit almost effortless erection and structural efficiency. The precast frame systems discussed in the book are similar to that of steel frames, but offer similar savings to concrete frames. The design of connections and detailed analysis of their structural behavior is discussed in detail. Fundamentals with regards to the post yield behavior of concrete and metal are also presented to illustrate how these two different materials are integrated together to remove individual material drawbacks. Readers are given a broad introduction to existing technologies that are then combined with a description of the construction methods the author proposes. This book will help the end users become familiar with the existing types of structural forms, not just the "Lego" type frame system that the author proposes. Discusses how traditional construction methods can be replaced by innovative hybrid composite precast frame systems that provide rapid and effortless erection capabilities and structural efficiency Contains several design examples using non-linear finite element analysis completed with Abaqus based-software Contains new milestone inventions in construction that offer structural engineering solutions using a novel, modularized hybrid frame system Provides information on structural testing that verifies the accuracy of the structural design

The purpose of this publication is to show how precast concrete may be mixed in combination with other structural materials to maximise overall building performance. The other materials are: cast insitu concrete, reinforced and post-tensioned, structural steelwork, timber and glue-laminated timber, masonry in brickwork and blockwork, glass and glazing. The aim is to provide a companion volume to composite Floor Structures [FIP, 1998] and to show some of the many other ways that precast concrete can be used to advantage with other materials. The term mixed precast construction is used to describe these other combinations. The intention is not to discuss design calculations - that is for a future 'fib Guide to good practice'. Instead, the bulletin is meant as a 'State-of-art' publication showing photographs, sketches and details of precast concrete with other materials. There are no design equations, although some technical information on how to combine the materials, e.g. bearings, connections,

tolerances, thermal and shrinkage effects, etc., is included if appropriate. Thus, the document focuses on the use of mixed construction in multistorey buildings, offices, housing, grandstands, parking garages, and industrial warehouses, etc. i. e. on precast concrete as the main construction material and looks at the manner in which other materials can be integrated. Chapter by chapter the strengths and weakness of each material studied are assessed as part of the total building design. In some cases it is obvious that the load carrying performance of one material outweighs another. In other cases aspects such as thermal, fire, vibration, fatigue, creep, acoustic, seismic and visual characteristics, and the geographical local availability of that material, may be critical. A world-wide survey, presented in Table 1.1, found that precast concrete is a universal building material, but mixed construction is limited mostly to developed countries where structural steelwork and types of timber, such as glue-laminated timber, is readily available. In addition there may be design, detailing, production, transportation, erection and maintenance limitations, which do or do not favour mixed construction.

Ordinary concrete is strong in compression but weak in tension. Even reinforced concrete, where steel bars are used to take up the tension that the concrete cannot resist, is prone to cracking and corrosion under low loads. Prestressed concrete is highly resistant to stress, and is used as a building material for bridges, tanks, shell roofs, floors, buildings, containment vessels for nuclear power plants and offshore oil platforms. With a wide range of benefits such as crack control, low rates of corrosion, thinner slabs, fewer joints and increased span length; prestressed concrete is a stronger, safer, more economical and more sustainable building material. The introduction of the Eurocodes has necessitated a new approach to the design of prestressed concrete structures and this book provides a comprehensive practical guide for professionals through each stage of the design process. Each chapter focuses on a specific aspect of design Fully consistent with Eurocode 2, and the associated parts of Eurocodes 1 and 8 Examples of challenges often encountered in professional practice worked through in full Detailed coverage of post-tensioned structures Extensive coverage of design of flat slabs using the finite element method Examples of pre-tensioned and post-tensioned bridge design An introduction to earthquake resistant design using EC 8 Examining the design of whole structures as well as the design of sections through many fully worked numerical examples which allow the reader to follow each step of the design calculations, this book will be of great interest to practising engineers who need to become more familiar with the use of the Eurocodes for the design of prestressed concrete structures. It will also be of value to university students with an interest in the practical design of whole structures.

The traveling public has no patience for prolonged, high cost construction projects. This puts highway construction contractors under intense pressure to minimize traffic disruptions and construction cost. Actively promoted by the Federal Highway Administration, there are hundreds of accelerated bridge construction (ABC) construction programs in the United States, Europe and Japan. Accelerated Bridge Construction: Best Practices and Techniques provides a wide range of construction techniques, processes and technologies designed to maximize bridge construction or reconstruction operations while minimizing project delays and community disruption. Describes design methods for accelerated bridge substructure construction; reducing foundation construction time and methods by using pile bents Explains applications to steel bridges, temporary bridges in place of detours using quick erection and demolition Covers design-build systems' boon to ABC; development of software; use of fiber reinforced polymer (FRP) Includes applications to glulam and sawn lumber bridges, precast concrete bridges, precast joints details; use of lightweight aggregate concrete, aluminum and high-performance steel

This report describes a recommended methodology for reliably quantifying building system performance and response parameters for use in seismic design. The recommended methodology (referred to herein as the Methodology) provides a rational basis for establishing global seismic performance factors (SPFs), including the response modification coefficient (R factor), the system overstrength factor, and deflection amplification factor (Cd), of new seismic-force-resisting systems proposed for inclusion in model building codes. The purpose of this Methodology is to provide a rational basis for determining building seismic performance factors that, when properly implemented in the seismic design process, will result in equivalent safety against collapse in an earthquake, comparable to the inherent safety against collapse intended by current seismic codes, for buildings with different seismic-force-resisting systems.

This book examines the application of strut-and-tie models (STM) for the design of structural concrete. It presents state-of-the-art information, from fundamental theories to practical engineering applications, and also provides innovative solutions for many design problems that are not otherwise achievable using the traditional methods.

Modernisation, Mechanisation and Industrialisation of Concrete Structures discusses the manufacture of high quality prefabricated concrete construction components, and how that can be achieved through the application of developments in concrete technology, information modelling and best practice in design and manufacturing techniques.

This second edition of Precast Concrete Structures introduces the conceptual design ideas for the prefabrication of concrete structures and presents a number of worked examples that translate designs from BS 8110 to Eurocode EC2, before going into the detail of the design, manufacture, and construction of precast concrete multi-storey buildings. Detailed structural analysis of precast concrete and its use is provided and some details are presented of recent precast skeletal frames of up to forty storeys. The theory is supported by numerous worked examples to Eurocodes and European Product Standards for precast reinforced and prestressed concrete elements, composite construction, joints and connections and frame stability, together with extensive specifications for precast concrete structures. The book is extensively illustrated with over 500 photographs and line drawings.

The new edition of Volume 4 of this well-known five volume series deals with more complex multi-storey and industrial/commercial buildings. The new edition has been revised to bring it into line with the series design and includes new details on structural sealant glazing, solid brick and block internal walls, and metal stud partitions for non-loadbearing partitions.

Post-tensioning is the most versatile form of pre-stressing, a technique which enables engineers to make the most effective use of the material properties of concrete, and so to design structural elements which are strong, slender and efficient. Design in post-tensioned concrete is not difficult and, if done properly, can contribute significantly to the economy and the aesthetic qualities of a building. Post-tensioned floors have found widespread use in office buildings and car park structures, and are also frequently employed in warehouses and public buildings. However, in spite of this, most prestressed concrete texts devote comparatively little attention to floors, concentrating instead on beam elements. This book answers the need for a comprehensive treatment of post-tensioned floor design.