Design Of Seismic Retrofitting Of Reinforced Concrete

Strengthening and Retrofitting of Existing StructuresRetrofitting of Heritage StructuresAdvanced Design Examples of Seismic Retrofit of StructuresFastenings for Seismic RetrofittingPlanning and Engineering Guidelines for the Seismic Retrofitting of Historic Adobe StructuresSeismic Assessment and Retrofit of Reinforced Concrete BuildingsSeismic Design, Assessment and Retrofitting of Concrete BuildingsSeismic Retrofit of Existing Reinforced Concrete BuildingsSeismic Retrofit of Existing BuildingsMulti-criteria Decision Framework for Seismic Retrofitting of Low-rise BuildingsHandbook on Seismic Retrofit of BuildingsSeismic Analysis and Retrofitting of Historical BuildingsGuidelines for Seismic Retrofit of Existing BuildingsCompte rendu des s□ ances publi□ Seismic Retrofitting: Learning from Vernacular ArchitectureSeismic Retrofitting of StructuresRetrofitting of Concrete Structures by Externally Bonded FRPs, With Emphasis on Seismic ApplicationsQualifications for Seismic Retrofitting of Bridge Columns Using CompositesEARTHQUAKE RESISTANT DESIGN OF STRUCTURESQualifications for Seismic Retrofitting of Bridge Columns Using Composites: Nondestructive evaluation (NDE) development S. Syngellakis Mohammad Yekrangnia Comit□ euro-international du b□ ton E. Leroy Tolles fib F□ d□ ration internationale du b□ ton Michael N. Fardis Stelios Antoniou Matthew Fox Reza Pashaei Amarnath Chakrabarti Antonio Formisano Mariana R. Correia Thomas Wenk (Bauingenieur) fib F□ d□ ration internationale du b□ ton AGRAWAL, PANKAJ

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seismic retrofitting is the modification of existing structures to make them more resistant to seismic activity ground motion or soil failure due to earthquakes the planning of changes to existing buildings differs from new planning through an important condition the existing construction must be taken as the basis of all planning and building actions the need for seismic retrofitting of an existing building can arise due to several reasons like building not designed to code subsequent updating of code and design practice subsequent upgrading of seismic zone deterioration of strength and aging modification of existing structure change in use of the building etc seismic retrofit is primarily applied to achieve public safety with various levels of structure and material survivability determined by economic considerations in recent years an increased urgency has been felt to strengthen the deficient buildings as part of active disaster mitigation and to work out the modifications that may be made to

AN EXISTING STRUCTURE TO IMPROVE THE STRUCTURAL PERFORMANCE DURING AN EARTHQUAKE SEISMIC RETROFITTING SCHEMES CAN BE EITHER GLOBAL OR LOCAL BASED ON HOW MANY MEMBERS OF THE STRUCTURES THEY ARE USED FOR GLOBAL RETROFIT METHODS INCLUDE CONVENTIONAL METHODS INCREASE SEISMIC RESISTANCE OF EXISTING STRUCTURES OR NON CONVENTIONAL METHODS REDUCTION OF SEISMIC DEMAND STRENGTHENING AND RETROFITTING OF EXISTING STRUCTURES IS A COMPENDIUM OF CUTTING EDGE TRENDS OF THE RESEARCH AND EXISTING PRACTICES IN STRENGTHENING AND RETROFITTING OF STRUCTURAL ELEMENTS AS WELL AS THE FINDINGS OF A RESEARCH ENDEAVOR INITIATED BY THE AUTHORS TO INVESTIGATE AND DEVELOP A ROBUST STRUCTURAL RETROFITTING SCHEME BY UTILIZING ELASTOMERIC POLYMERS TO ENHANCE THE RESISTANCE OF REINFORCED CONCRETE RC STRUCTURES IT ADDRESSES IN DETAIL SPECIFIC TECHNIQUES FOR THE STRENGTHENING OF TRADITIONAL CONSTRUCTIONS REINFORCED CONCRETE BUILDINGS BRIDGES AND THEIR FOUNDATIONS IT ALSO PRESENTS INSIGHT INTO THE KEY ISSUES RELEVANT TO SEISMIC RETROFIT OF CONCRETE FRAME BUILDINGS MANY GUIDELINES ARE REVIEWED REGARDING SEISMIC REHABILITATION OF SCHOOL OFFICE HOSPITAL AND APARTMENT BUILDINGS

THE PRESERVATION OF HERITAGE ARCHITECTURE IS A CULTURAL OBJECTIVE RIGOROUSLY PURSUED BY COMMUNITIES AND NATIONS WISHING TO PROMOTE THEIR HISTORY CIVILISATION AND AESTHETIC ACHIEVEMENTS STRUCTURES BUILT IN THE REMOTE PAST BY TRADITIONAL METHODS HAVE SUFFERED THE CONSEQUENCES OF EXTREME LOADING EVENTS SUCH AS EARTHQUAKES OVER LONG TIME PERIODS RETROFITTING IS AN APPROACH BASED ON RECENT TECHNOLOGICAL DEVELOPMENTS AND SCIENTIFIC KNOWLEDGE WHEREBY MODERN CONSTRUCTION METHODS AND MATERIALS ARE APPLIED TO THE REPAIR AND STRENGTHENING OF HISTORICAL STRUCTURES THIS BOOK AIMS TO INFORM ON CURRENT RETROFITTING TECHNIQUES THEIR APPLICATION TO VARIOUS TYPES OF HISTORICAL ARCHITECTURE AND THEIR EFFECTIVENESS TO FULFIL THEIR PURPOSE RETROFITTED STRUCTURAL FORMS COVERED IN THE BOOK VARY WIDELY FROM AGE OLD PLACES OF WORSHIP SUCH AS CHURCHES MOSQUES AND TEMPLES AS WELL AS CASTLES AND PALACES TO MORE MODERN DISTINGUISHED PRIVATE RESIDENCES OR PUBLIC BUILDINGS SOME OF THEM DESIGNED BY WELL KNOWN ARCHITECTS THEIR METHODS OF CONSTRUCTION RANGE FROM TRADITIONAL SUCH AS STONE OR BRICK MASONRY TO MORE RECENT TEXTILE

BLOCK SYSTEMS AND EVEN REINFORCED CONCRETE FRAMEWORKS REFERENCE IS MADE TO DETAILED VISUAL INSPECTIONS OF DAMAGED STRUCTURE PROVIDING VALUABLE INSIGHT INTO POSSIBLE CAUSES OF FAILURE SUCH INSPECTIONS ARE USUALLY COMBINED WITH MATERIAL CHARACTERISATION WHICH IS AN ESSENTIAL INPUT TO NUMERICAL MODELLING FOR ASSESSING THE BEHAVIOUR OF THE STRUCTURE BEFORE AND AFTER RETROFITTING THE BOOK DESCRIBES STRENGTHENING TECHNIQUES FOR MASONRY WALLS INCLUDING RE POINTING INJECTION GROUTING AND THE USE OF STEEL TIES THE USE OF REINFORCED CONCRETE IS PROPOSED IN THE FORM OF CAST IN PLACE WALLS JACKETS OR TIE BEAMS THAT OF CARBON FIBRE REINFORCED LAMINATES FOR STRENGTHENING WALLS AND SLABS INNOVATIVE USE OF MATERIALS SUCH AS SHAPE MEMORY ALLOYS SELF COMPACTING CONCRETE OR THIN LEAD LAYERS IS ALSO SUGGESTED PARTICULAR ATTENTION IS GIVEN TO METHODS FOR MODERATING THE CONSEQUENCES OF DESTRUCTIVE EARTHQUAKES SEISMIC ENERGY ABSORBING DEVICES AND BASE ISOLATION SYSTEMS ARE TWO EFFECTIVE MEANS OF PROVIDING PROTECTION AGAINST FUTURE SEISMIC EVENTS ALTHOUGH THEIR APPLICATION IS OFTEN MET WITH MANY TECHNICAL CHALLENGES IN PRACTICE RETROFITTING OF HERITAGE STRUCTURES AGAINST EARTHQUAKES WILL BE OF INTEREST TO MEMBERS OF ACADEMIC INSTITUTIONS GOVERNMENT OR PRIVATE CULTURAL PRESERVATION ESTABLISHMENTS AND SPECIALIST CONSULTANT ENGINEERS THE BOOK CONTAINS VERY PRACTICAL TECHNICAL ADVICE ON MANY ISSUES THIS WOULD BE OF CONSIDERABLE INTEREST TO CONSTRUCTION COMPANIES SPECIALISING IN REPAIRS AND MAINTENANCE OF HISTORICAL STRUCTURES

ADVANCED DESIGN EXAMPLES OF SEISMIC RETROFIT OF STRUCTURES PROVIDES INSIGHTS ON THE PROBLEMS ASSOCIATED WITH THE SEISMIC RETROFITTING OF EXISTING STRUCTURES THE AUTHORS PRESENT VARIOUS INTERNATIONAL CASE STUDIES OF SEISMIC RETROFITTING PROJECTS AND THE DIFFERENT POSSIBLE STRATEGIES ON HOW TO HANDLE COMPLEX PROBLEMS ENCOUNTERED USERS WILL FIND TACTICS ON A VARIETY OF PROBLEMS THAT ARE COMMONLY FACED INCLUDING PROBLEMS FACED BY ENGINEERS AND AUTHORITIES WHO HAVE LITTLE OR NO EXPERIENCE IN THE PRACTICE OF SEISMIC RETROFITTING PROVIDES SEVERAL EXAMPLES OF RETROFITTING PROJECTS THAT COVER DIFFERENT STRUCTURAL SYSTEMS FROM NON ENGINEERED HOUSES TO FRAME BUILDINGS PRESENTS VARIOUS RETROFITTING METHODS THROUGH EXAMPLES PROVIDES DETAILED STEP BY STEP

DESIGN PROCEDURES FOR EACH EXAMPLE INCLUDES REAL RETROFIT PROJECTS WITH PHOTOS OF THE DETAILS OF VARIOUS RETROFITTING TECHNIQUES CONTAINS SEVERAL MODELING DETAILS AND HINTS MAKING USE OF VARIOUS SOFTWARE IN THIS AREA

THE ECONOMIC CONSEQUENCES AND LOSS OF LIFE MAKE EARTHQUAKE DISASTERS CATASTROPHIC ANYWHERE IN THE WORLD SEISMIC RETROFITTING OR REPAIR OF BUILDINGS IS AN ESSENTIAL COMPONENT FOR MITIGATING THE EFFECTS OF EARTHQUAKES THIS STATE OF THE ART REPORT REVIEWS AND INTRODUCES THE LATEST DESIGN CONCEPTS AND METHODS FOR SEISMIC RETROFITTING THROUGHOUT THE WORLD WITH EMPHASIS ON THE USE OF FASTENING SYSTEMS

ADOBE OR MUD BRICK HAS BEEN WIDELY USED AS A BUILDING MATERIAL IN THE AMERICAN SOUTHWEST INCLUDING CALIFORNIA THE VULNERABILITY OF MANY ORIGINAL ADOBE STRUCTURES TO DAMAGE OR DESTRUCTION FROM EARTHQUAKES HAS BEEN OF GREAT CONCERN THE GUIDELINES PRESENTED HERE ADDRESS THE PRACTICAL ASPECTS OF THIS PROBLEM AND REPRESENT THE CULMINATION OF 12 YEARS OF RESEARCH AND TESTING ON THE SEISMIC RETROFITTING OF ADOBE BUILDINGS THESE GUIDELINES CAN ASSIST IN THE PLANNING OF SEISMIC RETROFITTING PROJECTS CONSISTENT WITH BOTH CONSERVATION PRINCIPLES AND ESTABLISHED PUBLIC POLICY

IN MOST PARTS OF THE DEVELOPED WORLD THE BUILDING STOCK AND THE CIVIL INFRASTRUCTURE ARE AGEING AND IN CONSTANT NEED OF MAINTENANCE REPAIR AND UPGRADING MOREOVER IN THE LIGHT OF OUR CURRENT KNOWLEDGE AND OF MODERN CODES THE MAJORITY OF BUILDINGS STOCK AND OTHER TYPES OF STRUCTURES IN MANY PARTS OF THE WORLD ARE SUBSTANDARD AND DEFICIENT THIS IS ESPECIALLY SO IN EARTHQUAKE PRONE REGIONS AS EVEN THERE SEISMIC DESIGN OF STRUCTURES IS RELATIVELY RECENT IN THOSE REGIONS THE MAJOR PART OF THE SEISMIC THREAT TO HUMAN LIFE AND PROPERTY COMES FROM OLD BUILDINGS DUE TO THE INFRASTRUCTURE S INCREASING DECAY FREQUENTLY COMBINED WITH THE NEED FOR STRUCTURAL UPGRADING TO MEET MORE STRINGENT DESIGN REQUIREMENTS ESPECIALLY AGAINST SEISMIC LOADS STRUCTURAL RETROFITTING IS BECOMING MORE AND MORE IMPORTANT AND RECEIVES TODAY CONSIDERABLE EMPHASIS THROUGHOUT THE WORLD IN

response to this need a major part of the fib model code 2005 currently under development is being devoted to structural conservation and maintenance more importantly in recognition of the importance of the seismic threat arising from existing substandard buildings the first standards for structural upgrading to be promoted by the international engineering community and by regulatory authorities alike are for seismic rehabilitation of buildings this is the case for example of part 3 strengthening and repair of buildings of eurocode 8 i e of the draft european standard for earthquake resistant design and which is the only one among the current 2003 set of 58 eurocodes attempting to address the problem of structural upgrading it is also the case of the recent 2001 asce draft standard on seismic evaluation of existing buildings and of the 1996 law for promotion of seismic strengthening of existing reinforced concrete structures in japan as noted in chapter 1 of this bulletin fib as ceb and fip did before has placed considerable emphasis on assessment and rehabilitation of existing structures the present bulletin is a culmination of this effort in the special but very important field of seismic assessment and rehabilitation it has been elaborated over a period of 4 years by task group 7 1 assessment and retrofit of existing structures of fib commission 7 seismic design a truly international team of experts representing the expertise and experience of all the important seismic regions of the world in the course of its work the team had six plenary two day meetings in january 1999 in pavia italy in august 1999 in raleigh north carolina in february 2000 in queenstown new zealand in july 2000 in patras greece in march 2001 in lausanne switzerland and in august 2001 in seattle washington in october 2002 the final draft of the bulletin was presented to public during the 1st fib congress in osaka it was also there that it was approved by fib commission 7 seismic design the contents is structured into main chapters as follows 1 introduction 2 performance objectives and system considerations 3 review of seismic assessment procedures 4 strength and deformation capacity of non seismically detailed components 5 seismic retrofitting techniques 6 probabilistic concepts and methods 7 case studies

reflecting the historic first european seismic code this professional book focuses on seismic design assessment and retrofitting of concrete buildings with thorough reference to and application of en eurocode 8 following the publication of en eurocode 8 in 2004 05 30 countries are now introducing this european standard for seismic design for application in parallel with existing national standards till march 2010 and exclusively after that eurocode 8 is also expected to influence standards in countries outside europe or at the least to be applied there for important facilities owing to the increasing awareness of the threat posed by existing buildings substandard and deficient buildings and the lack of national or international standards for assessment and retrofitting its impact in that field is expected to be major written by the lead person in the development of the en eurocode 8 the present handbook explains the principles and rationale of seismic design according to modern codes and provides thorough guidance for the conceptual seismic design of concrete buildings and their foundations it examines the experimental behaviour of concrete members under cyclic loading and modelling for design and analysis purposes it develops the essentials of linear or nonlinear seismic analysis for the purposes of design assessment and retrofitting especially using eurocode 8 and gives detailed guidance for modelling concrete buildings at the member and at the system level moreover readers gain access to overviews of provisions of eurocode 8 plus an understanding for them on the basis of the simple models of the element behaviour presented in the book also examined are the modern trends in performance and displacement based seismic assessment of existing buildings comparing the relevant provisions of eurocode 8 with those of new us prestandards and details of the most common and popular seismic retrofitting techniques for concrete buildings and guidance for retrofitting strategies at the system level comprehensive walk through examples of detailed design elucidate the application of eurocode 8 to common situations in practical design examples and case studies of seismic assessment and retrofitting of a few real buildings are also presented from the reviews this is a massive book that has no equal in the published literature as far as the reviewer knows it is dense and comprehensive and leaves nothing to chance it is certainly taxing on the reader and the

potential user but without it use of eurocode 8 will be that much more difficult in short this is a must read book for researchers and practitioners in europe and of use to readers outside of europe too this book will remain an indispensable backup to eurocode 8 and its existing designers guide to en 1998 1 and en 1998 5 published in 2005 for many years to come congratulations to the author for a very well planned scope and contents and for a flawless execution of the plan amr s elnashai the book is an impressive source of information to understand the response of reinforced concrete buildings under seismic loads with the ultimate goal of presenting and explaining the state of the art of seismic design underlying the contents of the book is the in depth knowledge of the author in this field and in particular his extremely important contribution to the development of the european design standard en 1998 eurocode 8 design of structures for earthquake resistance however although eurocode 8 is at the core of the book many comparisons are made to other design practices namely from the us and from japan thus enriching the contents and interest of the book eduardo c carvalho

seismic retrofit of existing reinforced concrete buildings understand the complexities and challenges of retrofitting building infrastructure across the world buildings are gradually becoming structurally unsound many were constructed before seismic load capacity was a mandatory component of building standards and were often built with low quality materials or using unsafe construction practices many more are simply aging with materials degrading and steel corroding as a result efforts are ongoing to retrofit existing structures and to develop new techniques for assessing and enhancing seismic load capacity in order to create a safer building infrastructure worldwide seismic retrofit of existing reinforced concrete buildings provides a thorough book length discussion of these techniques and their applications balancing theory and practice the book provides engineers with a broad base of knowledge from which to approach real world seismic assessments and retrofitting projects it incorporates knowledge and experience frequently omitted from the building design process for a fuller account of this critical

ENGINEERING SUBFIELD SEISMIC RETROFIT OF EXISTING REINFORCED CONCRETE BUILDINGS READERS WILL ALSO FIND DETAILED TREATMENT OF EACH AVAILABLE STRENGTHENING TECHNIQUE COMPLETE WITH ADVANTAGES AND DISADVANTAGES IN DEPTH GUIDELINES TO SELECT A SPECIFIC TECHNIQUE FOR A GIVEN BUILDING TYPE AND OR ENGINEERING SCENARIO STEP BY STEP GUIDANCE THROUGH THE ASSESSMENT RETROFITTING PROCESS SEISMIC RETROFIT OF EXISTING REINFORCED CONCRETE BUILDINGS IS AN IDEAL REFERENCE FOR CIVIL AND STRUCTURAL ENGINEERING PROFESSIONALS AND ADVANCED STUDENTS PARTICULARLY THOSE WORKING IN SEISMICALLY ACTIVE AREAS

SEISMIC RETROFIT OF EXISTING BUILDINGS IS A CONCISE AND EASY TO USE GUIDELINE FOR PRACTISING ENGINEERS TO ASSESS AND DESIGN SUCCESSFUL SEISMIC RETROFIT INTERVENTIONS FOR EXISTING VULNERABLE BUILDINGS IT OFFERS READERS GUIDANCE ON BOTH CONCEPTUAL DESIGN STRATEGIES AND RELEVANT DETAILED DESIGN CONSIDERATIONS

THE HANDBOOK ON SEISMIC RETROFIT OF BUILDINGS IS A COMPILED SOURCE OF TECHNICAL INFORMATION FOR ENGINEERS AND PROFESSIONALS IN THE BUILDINGS INDUSTRY DECISION MAKING OFFICIALS AND STUDENTS THE HANDBOOK IS DIVIDED INTO 17 CHAPTERS COVERING BASIC CONCEPTS OF EARTHQUAKES SEISMIC DESIGN AND RETROFIT OF BUILDINGS SEISMIC VULNERABILITY ASSESSMENT RETROFIT STRATEGIES FOR DIFFERENT TYPES OF BUILDINGS GEOTECHNICAL AND FOUNDATION ASPECTS ADVANCED APPLICATIONS QUALITY ASSURANCE AND CASE STUDIES

THIS EBOOK IS A COLLECTION OF ARTICLES FROM A FRONTIERS RESEARCH TOPIC FRONTIERS RESEARCH TOPICS ARE VERY POPULAR TRADEMARKS OF THE FRONTIERS JOURNALS SERIES THEY ARE COLLECTIONS OF AT LEAST TEN ARTICLES ALL CENTERED ON A PARTICULAR SUBJECT WITH THEIR UNIQUE MIX OF VARIED CONTRIBUTIONS FROM ORIGINAL RESEARCH TO REVIEW ARTICLES FRONTIERS RESEARCH TOPICS UNIFY THE MOST INFLUENTIAL RESEARCHERS THE LATEST KEY FINDINGS AND HISTORICAL ADVANCES IN A HOT RESEARCH AREA FIND OUT MORE ON HOW TO HOST YOUR OWN FRONTIERS RESEARCH TOPIC OR CONTRIBUTE TO ONE AS AN AUTHOR BY CONTACTING THE FRONTIERS EDITORIAL OFFICE FRONTIERSIN ORG ABOUT CONTACT

THIS RENAMED VERSION OF THE FORMER UNIFORM CODE FOR BUILDING CONSERVATION GUIDELINES FOR RETROFITTING UNREINFORCED MASONRY BEARING WALL BUILDINGS REINFORCED CONCRETE AND REINFORCED MASONRY BUILDINGS WOOD FRAME RESIDENTIAL BUILDINGS AND CONCRETE WITH MASONRY INFILL BUILDINGS

LOCAL COMMUNITIES HAVE ADAPTED FOR CENTURIES TO CHALLENGING SURROUNDINGS RESULTING FROM UNFORESEEN NATURAL HAZARDS VERNACULAR ARCHITECTURE OFTEN REVEALS VERY INTELLIGENT RESPONSES ATTUNED TO THE ENVIRONMENT THEREFORE THE QUESTION THAT EMERGED WAS HOW DID LOCAL POPULATIONS PREPARE THEIR DWELLINGS TO FACE FREQUENT EARTHQUAKES IT WAS TO RESPOND TO THIS GAP IN KNOWLEDGE THAT THE SEISMIC V RESEARCH PROJECT WAS INSTIGATED AND THIS INTERDISCIPLINARY INTERNATIONAL PUBLICATION WAS PREPARED THE RESEARCH REVEALED THE EXISTENCE OF A LOCAL SEISMIC CULTURE IN TERMS OF REACTIVE OR PREVENTIVE SEISMIC RESISTANT MEASURES ABLE TO SURVIVE IF PROPERLY MAINTAINED IN AREAS WITH FREQUENT EARTHQUAKES THE FUNDAMENTAL CONTRIBUTION AND AIMS OF THE PUBLICATION WERE TO ENHANCE THE DISCIPLINARY INTEREST IN VERNACULAR ARCHITECTURE ITS CONTRIBUTION TO RISK MITIGATION IN RESPONDING TO NATURAL HAZARDS TO ENCOURAGE ACADEMIC AND SCIENTIFIC RESEARCH COLLABORATION AMONG DIFFERENT DISCIPLINES TO CONTRIBUTE TO THE IMPROVEMENT OF VERNACULAR DWELLINGS WHICH HALF OF THE WORLD S POPULATION STILL INHABITS NOWADAYS FIFTY INTERNATIONAL RESEARCHERS AND EXPERTS PRESENTED CASE STUDIES FROM LATIN AMERICA THE MEDITERRANEAN EASTERN AND CENTRAL ASIA AND THE HIMALAYAS REGION WITH REFERENCE TO 20 COUNTRIES I E ALGERIA BOLIVIA BHUTAN CHILE CHINA EGYPT EL SALVADOR GREECE HAITI ITALY JAPAN MEXICO MOROCCO NEPAL NICARAGUA PERU ROMANIA TAIWAN TURKEY AND A CLOSER DETAILED ANALYSIS OF PORTUGAL THIS PUBLICATION BRINGS TOGETHER 43 CONTRIBUTIONS WITH NEW PERSPECTIVES ON SEISMIC RETROFITTING TECHNIQUES AND RELEVANT DATA ADDRESSING VERNACULAR ARCHITECTURE AN AMAZING SOURCE OF KNOWLEDGE AND TO THIS DAY HOME TO 4 BILLION PEOPLE

FIB BULLETIN 35 IS THE FIRST BULLETIN TO PUBLISH DOCUMENTATION FROM AN FIB SHORT COURSE THESE COURSES ARE HELD WORLDWIDE AND COVER ADVANCED KNOWLEDGE OF STRUCTURAL CONCRETE IN GENERAL OR SPECIFIC TOPICS THEY ARE ORGANIZED BY FIB AND GIVEN BY

internationally recognized experts in fib often supplemented with local experts active in fib they are based on the knowledge and expertise from fib s ten commissions and nearly fifty task groups fib bulletin 35 presents the course materials developed for the short course retrofitting of concrete structures through externally bonded frp with emphasis on seismic applications given in ankara and istanbul in june 2005 the course drew on expertise both from outside turkey and from the large pool of local experts on this subject in most countries of the world the building stock is ageing and needs continuous maintenance or repair moreover the majority of existing constructions are deficient in the light of current knowledge and design codes the problem of structural deficiency of existing constructions is especially acute in seismic regions as even there seismic design of structures is relatively recent the direct and indirect costs of demolition and reconstruction of structurally deficient constructions are often prohibitive furthermore they entail a substantial waste of natural resources and energy therefore structural retrofitting is becoming increasingly widespread throughout the world externally bonded fibre reinforced polymers frps are rapidly becoming the technique of choice for structural retrofitting they are cleaner and easier to apply than conventional retrofitting techniques reduce disruption to the occupancy and operation of the facility do not generate debris or waste and reduce health and accident hazards at the construction site as well as noise and air pollution in the surroundings fib bulletin 35 gives state of the art coverage of retrofitting through frps and presents relevant provisions from three recent standardisation milestones en 1998 3 2005 eurocode 8 design of structures for earthquake resistance part 3 assessment and retrofitting of buildings the 2005 draft of the turkish seismic design code and the italian regulatory document cnr dt 200 04 instructions for design execution and control of strengthening interventions by means of fibre reinforced composites 2004

this comprehensive and well organized book presents the concepts and principles of earthquake resistant design of structures in an easy to read style the use of these principles helps in the implementation of seismic design practice the book adopts a step

by step approach starting from the fundamentals of structural dynamics to application of seismic codes in analysis and design of structures the text also focusses on seismic evaluation and retrofitting of reinforced concrete and masonry buildings the text has been enriched with a large number of diagrams and solved problems to reinforce the understanding of the concepts intended mainly as a text for undergraduate and postgraduate students of civil engineering this text would also be of considerable benefit to practising engineers architects field engineers and teachers in the field of earthquake resistant design of structures

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