

Advanced fibre-reinforced polymer (FRP) composites for structural applications

Edited by Jiping Bai



Frp Composites In Civil Engineering Book

Nasim Uddin

Frp Composites In Civil Engineering Book:

Developments in fiber-reinforced polymer (FRP) composites for civil engineering N.U. Uddin, M.A.

Mousa, 2013-05-15 The chapter begins by discussing a new type of sandwich panel called composite structural insulated panels CSIPs intended to replace the traditional SIPs that are made of wood based materials A detailed analytical modeling procedure is presented in order to determine the global buckling interfacial tensile stress at facesheet core debonding critical wrinkling stress at facesheet core debonding equivalent stiffness and deflection for CSIPs The proposed models were validated using experimental results that have been conducted on full scale CSIP walls and floor panels In order to be used as a hazard resistant material a detailed section was presented to show the resistance of CSIP elements to the different types of hazard effects including impact loading floodwater effect fire effect and windstorm loading Developments in fiber-reinforced polymer (FRP) composites for civil engineering N. Uddin, A.M. Abro, J.D. Purdue, U. Vaidya, 2013-05-15 Abstract The primary objective of this chapter is first to introduce and demonstrate the application of thermoplastic woven glass reinforced polypropylene in the design of modular fiber reinforced bridge decks and next the development of jackets for confining concrete columns against compression and impact loading The design concept and manufacturing processes of the thermoplastic bridge deck composite structural system are presented by recognizing the structural demands required to support highway traffic Then the results of the small scale static cylinder tests and the impact tests of concrete columns are presented demonstrating that thermoplastic reinforcement jackets act to restrain the lateral expansion of the concrete that accompanies the onset of crushing maintaining the integrity of the core concrete and enabling much higher compression strains compared to CFRP composite wraps to be sustained by the compression zone before failure occurs **Developments** in Fiber-reinforced Polymer (FRP) Composites for Civil Engineering Nasim Uddin, 2013 The International Handbook of FRP Composites in Civil Engineering Manoochehr Zoghi, 2013-09-26 Fiber reinforced polymer FRP composites have become an integral part of the construction industry because of their versatility enhanced durability and resistance to fatigue and corrosion high strength to weight ratio accelerated construction and lower maintenance and life cycle costs Advanced FRP composite materials are also emerging for a wide range of civil infrastructure applications. These include everything from bridge decks bridge strengthening and repairs and seismic retrofit to marine waterfront structures and sustainable energy efficient housing The International Handbook of FRP Composites in Civil Engineering brings together a wealth of information on advances in materials techniques practices nondestructive testing and structural health monitoring of FRP composites specifically for civil infrastructure With a focus on professional applications the handbook supplies design guidelines and standards of practice from around the world It also includes helpful design formulas tables and charts to provide immediate answers to common questions Organized into seven parts the handbook covers FRP fundamentals including history codes and standards manufacturing materials mechanics and life cycle costs Bridge deck applications and the critical topic of

connection design for FRP structural members External reinforcement for rehabilitation including the strengthening of reinforced concrete masonry wood and metallic structures FRP composites for the reinforcement of concrete structures including material characteristics design procedures and quality assurance quality control QA QC issues Hybrid FRP composite systems with an emphasis on design construction QA QC and repair Quality control quality assurance and evaluation using nondestructive testing and in service monitoring using structural health monitoring of FRP composites including smart composites that can actively sense and respond to the environment and internal states FRP related books journals conference proceedings organizations and research sources Comprehensive yet concise this is an invaluable reference for practicing engineers and construction professionals as well as researchers and students It offers ready to use information on how FRP composites can be more effectively utilized in new construction repair and reconstruction and architectural engineering **FRP Composites in Civil Engineering** Jin-Guang Teng, 2001-11-15 This Proceedings contains the papers presented at the International Conference on FRP Composites in Civil Engineering held in Hong Kong China on 12 15 December 2001 The papers contributed from 24 countries cover a wide spectrum of topics and demonstrate the recent advances in the application of FRP Fibre reinforced polymer composites in civil engineering while pointing to future directions of research in this exciting area The International Handbook of FRP Composites in Civil Engineering Manoochehr Zoghi, 2013 Applications of high performance fiber reinforced polymer FRP composite materials have grown beyond just aerospace and marine industries into civil engineering and other related disciplines This book provides a complete primer on FRP composites including history constituent materials and basic mechanics and properties It focuses on professional applications such as nondestructive testing and evaluation composites for reinforcement design philosophies and quidelines It also includes helpful formulas tables and charts for easy reference and standards of practice from the UK Scandinavia Japan the US China Australia and other countries Fiber Reinforced Polymer (FRP) Composites for Infrastructure Applications Ravi Jain, Luke Lee, 2012-01-02 This overview examines current issues of fiber reinforced polymer FRP composites in civil infrastructure Part I engages topics related to durability and service life of FRP composites and how they contribute to sustainability while Part II highlights implementation and applications Advanced Fibre-Reinforced Polymer (FRP) Composites for Structural Applications Jiping Bai, 2013-09-30 Advanced fibre reinforced polymer FRP composites have become essential materials for the building of new structures and for the repair of existing infrastructure Advanced fibre reinforced polymer FRP composites for structural applications provides an overview of different advanced FRP composites and the use of these materials in a variety of application areas Part one introduces materials used in the creation of advanced FRP composites including polyester vinylester and epoxy resins Part two goes on to explore the processing and fabrication of advanced FRP composites and includes chapters on prepreg processing and filament winding processes Part three highlights properties of advanced FRP composites and explores how performance can

be managed and tested Applications of advanced FRP composites including bridge engineering pipe rehabilitation in the oil and gas industry and sustainable energy production are discussed in part four With its distinguished editor and international team of expert contributors Advanced fibre reinforced polymer FRP composites for structural applications is a technical resource for researchers and engineers using advanced FRP composites as well as professionals requiring an understanding of the production and properties of advanced FRP composites and academics interested in this field Provides an overview of different advanced FRP composites and the use of these materials in a variety of application areas Introduces materials used in the creation of advanced FRP composites including polyester vinylester and epoxy resins Explores the processing and fabrication of advanced FRP composites and includes chapters on prepreg processing and filament winding processes

Developments in fiber-reinforced polymer (FRP) composites for civil engineering P. Qiao, J.F. Davalos, 2013-05-15 This chapter presents a systematic approach for material characterization analysis and design of all fiber reinforced polymer or plastic FRP composite structures The suggested bottom up analysis concept is applied throughout the procedure from materials microstructures to macro components to structural members and finally to structural systems thus providing a systematic analysis methodology for all FRP composite structures The systematic approach described in this chapter can be used efficiently to analyze and design FRP shapes and bridge systems and also develop new design concepts for all composite structures

Developments in fiber-reinforced polymer (FRP) composites for civil engineering R. Liang, G. Hota, 2013-05-15 This chapter presents dozens of select environmental engineering applications of fiber reinforced polymer FRP composite materials with emphasis on their environmental benefits followed by discussions on durability of composites Significance of design codes and specifications in promoting and advancing the applications of FRP composites is addressed With ever increasing attention toward a sustainable built environment FRP composites have potential to be selected as a material of choice because of the performance and design advantages of FRPs

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