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DAY 1

Keynote Forum

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Eiki Yamaguchi et al, JET 2018 Volume: 7

DUCTILE CAST IRON DECK FOR BRIDGE

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Ductile cast iron is applied to a bridge deck. Since the fabrication of a cast iron product is based on casting, no welding is needed. The possibility of fatigue crack occurrence is therefore very little while fatigue crack is a serious problem in the orthotropic bridge deck made of steel. The cast iron deck would be light, about a half of the reinforced concrete (RC) deck slab, so that it could enhance the seismic resistance of a bridge as well. This is an important feature for a bridge in the seismic zone such as Japan. In the present study, the design analysis was done by FEM to take stress concentration into account and the maximum stress was made smaller than the allowable value. The deck has longitudinal and lateral stiffeners. All the connections such as those between the stiffeners and those between the deck plate and the stiffeners were rounded to reduce the stress concentration. That is an easy task for cast iron products. On the other hand, it was not so easy to produce a ductile cast iron deck with uniform material property, since the bridge deck is large and the width-to-thickness ratio of the deck is much larger than that of an existing cast iron product. Various computational simulations and casting processes were tried out before the deck panel with uniform material property was produced successfully. Then static test and fatigue test were conducted, which concluded that the ductile cast iron deck satisfies the requirements imposed by the Japanese design specifications for highway bridges.

Biography

Eiki Yamaguchi has received his PhD from Purdue University, USA. Currently, he is serving as a Professor at Department of Civil Engineering, Kyushu Institute of Technology, Japan. He has published more than 100 papers and serves as an Editorial Board Member of *Journal of Constructional Steel Research and International Journal of Advanced Steel Construction* as well as International Advisory Committee Members of several international conferences. His expertise includes Applied/ Structural Mechanics, Steel Structures and Bridges.

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Adolfo B Matamoros, JET 2018 Volume: 7

PERFORMANCE LIMITS AND COLLAPSE PROBABILITIES FOR NONDUCTILE RC BUILDINGS

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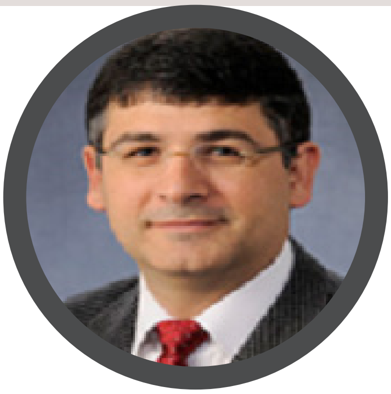

Recent earthquakes in Taiwan and Mexico City have shown that non-ductile reinforced concrete buildings present a great risk to human life because of their high probability of collapse during strong earthquakes. Among the population of older buildings, it is of utmost importance to identify the characteristics that increase the likelihood of failure of the gravity load system so that the most dangerous buildings can be singled out for corrective actions. Evaluation standards, such as ASCE-41, are increasingly being adopted by local authorities in the United States for this purpose. Building assessments are performed by estimating the spatial distribution of damage for a given seismic hazard using mathematical models created with modelling parameters and acceptance criteria specified in the standard. The seismic performance of a reinforced concrete (RC) frame structure is evaluated using a mathematical model assembled using the modelling parameters for nonlinear dynamic analysis in the ASCE 41-17 standard. The mathematical model includes nonlinearities associated with flexural and shear failure. The seismic hazard consisted of the set of far-fault ground motions in FEMA P695, scaled to the intensity of the MCE ground motion at the building site according to the provisions in FEMA P695. Probabilities of collapse due to lateral and local instabilities are presented as well as probabilities of achieving performance objectives of immediate occupancy, life safety, and collapse prevention.

Biography

Adolfo B Matamoros is the Peter T Flawn Professor in the Department of Civil and Environmental Engineering at the University of Texas at San Antonio, where he joined the Faculty in 2014. Prior to UTSA, he worked for 15 years at the University of Kansas, in Lawrence, KS where he held the titles of Professor, Associate Chair for Undergraduate Studies, and Director of Laboratories. He received his MS, PhD degrees in Civil Engineering from the University of Illinois at Urbana-Champaign in 1994 and 1999, respectively and the Degree of Licenciado (IPB) from the University of Costa Rica, in 1989. He is a Licensed Professional Engineer in the state of Texas and is active in multiple professional organizations including the American Concrete Institute, the American Society of Civil Engineers, and the Earthquake Engineering Research Institute. He has chaired national technical committees such as the joint ACI/ASCE Committee 408 on Bond and Development of Reinforcement, and the ACI 423-445 ad-Hoc Committee on shear/anchorage failure in end regions of prestressed members. He is a Voting Member of ACI Committees 374, Seismic Resistant Design; 341, Earthquake-Resistant Concrete Bridges; 369, Seismic Repair and Rehabilitation, and 445, Shear and Torsion.

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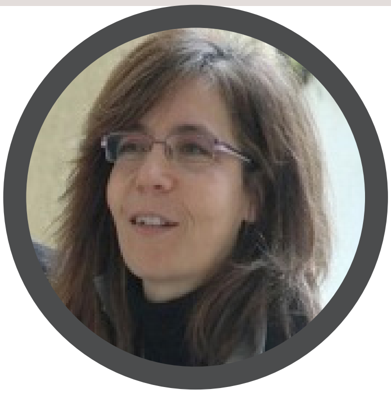
Mariaenrica Frigione, JET 2018 Volume: 7

DURABILITY OF CONCRETE STRUCTURE REINFORCED WITH FRP



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Fibre reinforced polymers (FRP) composites are increasingly employed worldwide for the rehabilitation of buildings or infrastructure systems, since they demonstrated to be effective in overcoming some of the well-known drawbacks experienced with traditional interventions and/or usual materials (such as concrete and steel), due to their low weights along with high specific strength and stiffness, resistance against corrosion, ease of installation and reduced manufacture time. These FRP systems substantially differ from those employed from long times in the more demanding aeronautical/aerospace or automotive industries, from the ingredient materials to the manufacture/application processes, from the final properties to the performance. In addition, the knowledge of long term performance and durability of FRP systems employed in such applications, in terms of their degradation/aging causes and mechanisms taking place in common as well as in harsh environmental conditions is still a critical issue for a safe and advantageous implementation of such advanced materials. This uncertainness, on the other hand hampers the enormous potential of composites in rehabilitation of constructions, since the acceptable lifetime of products employed in this field should be in the order of 100 years. The aim of this work is to critically illustrate the durability studies carried out on FRP for civil engineering applications based on current literature, summarizing the main findings and highlighting the issues that are not yet assessed and addressed.

Biography

Mariaenrica Frigione has received her PhD in Polymer Science and Technology from Loughborough University, UK in 1997. She has joined University of Salento in 1997 as Lecturer and as an Associate Professor in 2001. She is Vice-Rector of University of Salento for Technical Scientific Area and Delegate of the Rector for Internationalization since 2013. She is the Leader of Materials and Technologies for Constructions and Cultural Heritage research group, keeping scientific collaborations with Italian and international universities, research centres and companies. She is Co-author of three international patents on organic-inorganic hybrids; the license of two of them was sold to an Italian Company. She is Author/Co-author of around 100 papers published on International indexed Journals and 12 invited book chapters. She is a Member of the Editorial Board of ASCE *Journal of Composite for Constructions.* She is the Secretary of International Congress of Polymers in Concrete Association (ICPIC) since 2018 and Board of Directors Member in the sub-committee International Exchange since 2013.

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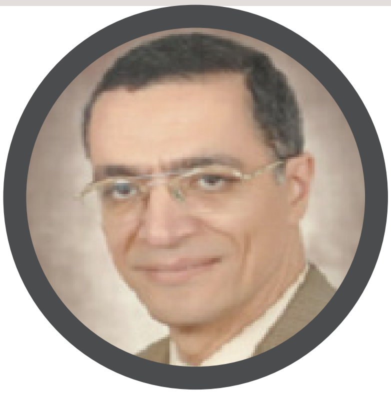
STRUCTURAL ASSESSMENT OF HISTORICAL MONUMENTS: THE JOURNEY FROM QUALITATIVE TO QUANTITATIVE ASSESSMENT



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The structural assessment of historical monuments is a challenge to engineers because current construction techniques use different systems and materials. Engineers are not trained to design massive structures that use structural elements made of stone and/or brick. The assessment requires a multidisciplinary team in order to understand the original construction, look for evidence and records for modifications throughout the life span of the structure and document deterioration due to environmental conditions. This requires knowledge of the monument history, use, geometrical dimensions of structural elements, defects and/or inclinations. Thus, feedback from the historian, architect, surveyor, materials and geotechnical engineer is required. Finite element modelling is typically used to predict the behavior of the different structural elements. Sometimes simple two dimensional models are sufficient to present the performance of the structure and other times three dimensional models are necessary. Model verification is an integral part of the analysis and is usually done by field measurements. For some structures, it is useful to perform free vibration measurements to determine the natural frequencies and use the measured values to tune the finite element model parameters. The mechanical properties of the construction materials as well as the soil under the foundation are key parameters that define the overall behavior of the structure.

Biography

Sherif A Mourad is currently serving as a Professor at the Structural Engineering Department, Faculty of Engineering, Cairo University. He obtained his Bsc in Civil Engineering and MSc in Structural Engineering from Cairo University in 1984 and 1987 respectively. He has completed his PhD in Modal Analysis and Buckling Effects on Steel Structures under Dynamic Loading in 1990 from the University of California, Irvine, USA. He was the Dean of the Faculty of Engineering, Cairo University from 2012-2016, and Vice Dean for Graduate Studies and Research from 2009-2012. He has published more than 120 technical papers in local and international journals as well as local and international conference proceedings. He has supervised 68 MSc thesis as well as 22 PhD dissertations that were awarded at Cairo University, in addition to supervision at other schools and universities.

His research interests are Earthquake Engineering, Seismic Performance of Steel Structures, Structural Assessment and Retrofit of Historical Buildings, Progressive Collapse Behavior and Prevention, Structural Health Monitoring

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Ekin Ozer, JET 2018 Volume: 7

A MOBILE CROWDSOURCING PATH TO SHM-INTEGRATED SEISMIC RELIABILITY ASSESSMENT

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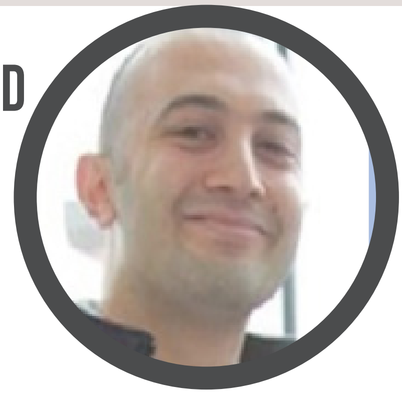

Despite tremendous rise in sensor and information technologies in the last four decades, structural health monitoring (SHM) discipline remained limited by structure scale applications. Advanced systems, instrumentation, and labour requirements obstructed widespread use of sensor technologies to monitor civil infrastructure. However, advent of smartphones is radically changing sensing notion with ubiquitous devices and citizen participation. Up to date examples show that smartphones can be used for monitoring of structural vibrations and produce valuable decision making tools for infrastructure authorities. This study merges latest advances in smartphone based SHM implementations with a broad perspective. Utilizing smartphone sensors through ordinary citizens, structural vibration data can be acquired at no cost and can be processed to diagnose structural characteristics, e.g. modal parameters. Smart monitoring tools and signal processing techniques can be adopted to eliminate citizen induced uncertainties from crowdsensed vibration data. The identified structural features can be used to calibrate theoretical models and improve accuracy and eventually conduct seismic performance evaluation or reliability assessment with updated models. In summary, from early feasibility tests to necessary crowdsourcing software platforms and from modal identification to model updating, seismic reliability estimation with calibrated models can be done. In this study, a new smart city concept is presented towards better and safer structural systems with modern sensing principles.

Biography

Ekin Ozer, after completing his BSc and MSc from Bogazici University Civil Engineering Department, has completed his PhD from Columbia University, Department of Civil Engineering and Engineering Mechanics. His work constituted the first crowdsourcing examples in vibration-based structural health monitoring field and produced numerous international journal publications scoping sensor technologies and smart structures. After working with Novum Structures specialized in steel and glass components and cladding systems, currently, he is with Middle East Technical University as an Assistant Professor

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NONLINEAR SEISMIC ANALYSIS FOR REGULAR AND IRREGULAR STRUCTURES

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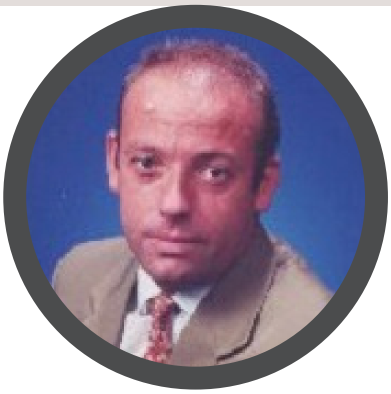

In past 20 years, several researchers have discussed the underlying assumptions and limitations of the pushover analysis. It has been found that, if a unique invariant force distribution proportional to the fundamental mode of vibration is assumed, satisfactory predictions of seismic demands are mostly restricted to regular in plane and in elevation low and medium-rise structures. Indeed, invariant force distributions are notable to take into account the redistribution of inertia forces due to yielding, and the associate change in the mode shape. Moreover, force distribution and displacement pattern related to the fundamental period of vibration do not account for the contribution of higher modes. To solve this drawback, Chopra (2003) proposed a method called modal pushover analysis (MPA), where the seismic demand due to the individual terms in the modal expansion of the earthquake forces is determined by a non-linear pushover analysis. To overcome the former limitations, and with the aims of bounding the likely distribution of interstory drifts and local ductility demands, seismic codes require that the analysis is performed enveloping the results obtained by using two different seismic force patterns: a load pattern aiming at reproducing the distribution of the seismic forces acting on the structure in the elastic state; an uniform or an adaptive load pattern aiming at bounding or reproducing the change in distribution of the seismic forces due to the progressive yielding of the structure. Numerical analyses performed in the last two decades have shown that the uniform load pattern is too conservative for the estimation of the response parameters for the lower floors of buildings, while all the adaptive load patterns proposed do not always succeed in providing a better estimation of the seismic response. In this context, in the proposed paper, firstly two very simple load distributions were proposed, one invariant and one adaptive. Each of the proposed load distributions is effective in bounding the seismic response of the structure without introducing the large overestimation of the seismic response. Regarding irregular structures, a modified version of the modal pushover in which correlation rule that takes into account the non-linear behaviour of structures is proposed. The effectiveness of the proposed load distributions are proved by comparison with the results provided by several lateral load distributions prescribed by international codes.

Biography

Piero Colajanni is currently serving as an Associate Professor of Structural Engineering at the DICAM, University of Palermo. He has completed his Msc in Civil Engineering in 1990 and PhD in Structural Engineering in 1995 from Palermo University. He was a Visiting Assistant Professor at Florida Atlantic University, Department of Mechanical Engineering in 1996 and a Researcher of Engineering and Solid Mechanics in 1997, and an Associate Professor in Structural Engineering in 2001 at University of Messina. In 2013, he moved to University of Palermo, where nowadays teaches building structural analysis and design, and seismic design of buildings. He was Promoter and President of the Scientific Committee of Master in Seismic Engineering at University of Messina in 2003 and 2006. He is the author of more than 150 papers on international and national journals, and conference proceedings. His research activities include in the fields of Structural Engineering and Seismic Engineering, focused on procedure for seismic design, vulnerability assessment and retrofitting of buildings, the use of innovative devices and materials for seismic protection of new and existing structure and design of hybrid steel truss concrete beams.

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