

FRP INTERNATIONAL

The Official Newsletter of the International Institute for FRP in Construction

Volume 2, Issue 2 (Special CICE Issue)

April 2005

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Welcome to the special CICE Issue of the IIFC Newsletter. This issue is dedicated to reports from the Second International Conference on FRP Composites in Civil Engineering held in Adelaide, Australia, and includes a report from the IIFC President, Dr. Jin-Guang Teng providing his perspective on what IIFC has achieved and plans for its future.

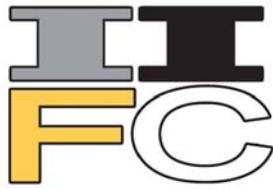
This year we anticipate publishing three further issues of the Newsletter, focusing on materials, applications, and durability /monitoring. As we move forward I'd like to invite our readers to submit material to the Newsletter on new applications of FRP in Construction, forthcoming conferences and workshops, or even general items that may be of interest to the worldwide community. I'd also like to encourage our readers to consider even opinion pieces that would serve to initiate discussion on topics of interest and importance. This is your Newsletter, and I hope it will serve as a forum for discussion across the globe, bringing together personnel from the research, construction, materials and product supply, and owner and user communities.

Material can be submitted directly to me at vkarbhari@ucsd.edu or to any of the members on the advisory or editorial boards. Please also feel free to write to me or to the President of IIFC, Prof. J.G. Teng (cejgteng@polyu.edu.hk), with any ideas you may have for the newsletter and for IIFC, itself

Vistasp M. Karbhari, Editor-in-Chief
Email: vkarbhari@ucsd.edu

In this issue

- **Report from the President**
- **Reports on CICE - Adelaide**
- **CICE Best Papers**
- **CICE 2006 - Miami**



President's Report

IIFC has now been in existence for two years, it only officially started accepting members a year ago. In this issue President Jin-Guang Teng provides an overview of how far IIFC has come so far, and what plans he has for the future

IIFC: Current Status and Future Development

by
Jin-Guang Teng, President, IIFC

In March 2003, the By-Laws of IIFC were finalized by an Ad-Hoc Committee and this Committee was subsequently converted into the founding Council of IIFC. These events signified the official formation of IIFC whose aim is to advance the understanding and the application of fibre-reinforced polymer (FRP) composites in the civil infrastructure, in the service of the engineering profession and society.

IIFC became fully operational on 1 January 2004 when it started to accept members, and in this sense, it has had a public life of only a little over one year. Over this short period, IIFC has made good progresses over a number of fronts. At the recent IIFC official biennial conference, namely the Second International Conference on FRP Composites in Civil Engineering held in Adelaide, Australia (CICE 2004), to which this issue of *the IIFC Newsletter* is devoted, I had the honor of being elected for a second term as the President of IIFC, having served as the founding President of IIFC from May 2003 to December 2004. In this short report, I would like to provide a brief summary of what has been achieved and outline my plan for IIFC for the next two years. Members are invited to send me their thoughts on the report; comments on the development plan are particularly welcome.

Summary of Activities and Achievements

In the first two years, the IIFC was in its conception and initial development stage. The following is a list of the more significant events and developments during these two years.

- Developed the IIFC by-laws, created and maintained the IIFC web site, and established the IIFC Secretariat at The Hong Kong Polytechnic University.
- Converted *FRP International* into the IIFC newsletter with Prof Vistasp Karbhari as the Editor-in-Chief. Two issues of the newsletter were published in 2004 and distributed to members and other interested parties.
- Designated the CICE conference series as the official conference series of IIFC. The first IIFC Official Conference, CICE 2004, was successfully held on 8-10 December in Adelaide, Australia.
- Launched the 4 best paper awards for the CICE conference series. An award committee chaired by Prof. Larry Bank made the selection of winning papers for the CICE 2004 conference.
- Started the formation of Working Groups with Prof Thomas Keller as the coordinator. The first batch of Working Groups was formed.
- Explored the development of an IIFC journal, leading to the signing of an agreement with the ASCE for the IIFC to become an official sponsor of the ASCE Journal of Composites for Construction.
- Developed a membership size of about 110 individual members and 3 Collective Members.

Development Plan for 2005-2006

Regular Activities

During 2005 and 2006, the following regular activities will continue and improvements to them will be explored where appropriate:

- Publication of the IIFC newsletter
- Organization of the CICE 2006 conference and selection of papers for the best paper awards
- Maintenance and further development of the web site
- Working Group activities as planned

Services from the IIFC Secretariat

During 2005 and 2006, the services of the Secretariat will be substantially enhanced through the appointment of a dedicated half-time secretary. Such dedicated support is essential for the further development of IIFC. I am pleased to announce that Miss Yvonne Lo has been appointed to this position and will provide support to the various committees of IIFC and the Council in the following aspects:

- day-to-day running of IIFC
- organization of various IIFC meetings
- promotion of IIFC to attract more members
- dissemination of information on IIFC activities
- monitoring of the budget of IIFC
- printing of IIFC publications such as the newsletter and Working Group reports
- maintenance and further development of the web site
- liaison with various parties within and outside IIFC
- any other appropriate activities

The Hong Kong Polytechnic University will continue to provide the office space for the Secretariat.

Web Site

The IIFC web site will also be substantially enhanced under the leadership of Dr Rudi Seracino who is the Web Site Coordinator and other members of the Executive Committee.

Desirable improvements include

- More information dissemination on FRP related activities world-wide and IIFC activities
- Provision of short CVs of members of the various IIFC committees and the Council and the Fellows
- Provision of appropriate information on Collective Members
- Discussion forum via the web site
- Database of research publications including papers and books on FRP composites for construction
- Establishment of a Members Only Area within the web site

Membership

The IIFC membership size shall be significantly expanded during 2005-2006. The new class of Student Members will be set up. Student Members pay only US\$25 per year. Invitations to join as Collective Members will be issued to leading organizations world-wide in the infrastructure FRP area.

Conferences, Workshops, Seminars, and Publications

Apart from the IIFC official conference, the IIFC (through its Working Groups where appropriate) will organize smaller-scale events such as specialist symposiums on selected topics. The IIFC will also sponsor appropriate conferences, workshops, seminars, and short courses.

An IIFC publication program will be developed. The IIFC will publish its newsletter, reports from its Working Groups, some of the proceedings of the IIFC conferences/symposia/workshops/seminars and any other documents as approved from time to time by its Executive Committee. Such IIFC publications will enhance the impact of IIFC.

Other Activities

Other activities that the IIFC is interested to develop include:

- Development of curricula and course materials to meet educational needs at different levels by the setting-up of a Working Group on the topic.
- Publication of a Who's Who book on FRP composites for construction
- Other activities which contribute to the fulfillment of the mission of IIFC.

Financial Status

At the end of 2004, the Institute received a total of HK\$58,759 from membership fees and spent a total of HK\$17,592 for the printing of the two issues of newsletter, the hosting cost of the web site and the purchase of the special paper for certificates etc. A surplus of HK\$41,166 was recorded and this surplus will be used to help cover the cost of the half-time secretary in 2005 and 2006. The Institute is still in a tight financial situation and a significant expansion of the membership size in 2005 and 2006 is necessary for its healthy long-term development.

Acknowledgements

I would also like take this opportunity to thank all those who, in numerous ways, have contributed to the successes of IIFC so far. They include members of the Council, the Advisory Committee and the Executive Committee, and many others. The strong support to IIFC shown by the international FRP community is very much appreciated. I look forward to your continued support to IIFC and to working with you towards even greater successes for IIFC in the years ahead.

Secretary's Report

A number of IIFC related meetings were held in Adelaide during the CICE 2004 conference. IIFC Secretary Jian-Fei Chen provides an overview of IIFC activities in this article.

IIFC Meetings in Adelaide
by
Jian-Fei Chen
The University of Edinburgh, UK
Email: J.F.Chen@ed.ac.uk

The IIFC held several meetings at its first official conference CICE2004 in Adelaide in December 2004. The president of the IIFC, Professor J.G. Teng, addressed the first General Meeting. A number of candidates were introduced to the meeting by the Executive Committee and three new members were successfully elected into the Council. These new Council members are:

- Professor Charles E. Bakis from Penn State University, USA;
- Dr Masoud Motavalli from EMPA, Switzerland and University of Tehran, Iran, representing Iran; *and*
- Professor Prof. Xiao-Ling Zhao from Monash University, Australia.

The council now has representation from 13 countries as listed at the end of this issue of the Newsletter.

The Council also elected three new fellows at its meeting on 8 December, including Professor Lawrence C. Bank, Professor Jin-Guang Teng and Professor Tamon Ueda. Brief biographies of the founding fellows and the new fellows are provided in a separate section following this article. The Council also decided to limit the

number of its fellowship to about 10% of its membership population in future.

The Council approved the proposal to hold its next official conference CICE 2006 in Miami in the USA in December 2006.

The Council also elected a new (the second) Executive Committee based on nominations from Council members which was organised by the Chairman of the Advisory Committee, Professor Len Hollaway. The new committee include three new members: Professor Ken Neale as a Vice-President, Dr Rudi Seracino as a member-at-large to coordinate the development of the IIFC website, and Professor Amir Mirmiran as the Conference Coordinator. The rest of the committee are from the previous (the first) Executive Committee. They were elected into or appointed to their second term in the same positions. The Council voted to change the by-laws to allow each member to hold the same position in the Executive Committee for a maximum of three terms. Members of the new Executive Committee can be found in this issue of the Newsletter. The updated by-laws are available at the IIFC website at <http://www.iifc-hq.org/>.

The Council approved the financial statement and the budget presented by the first Executive Committee. It supported the employment of a half-time secretary at the Secretariat. The Council decided to introduce a new class of membership, Student Members. Student members will enjoy a discounted annual membership fee of US\$25. They will also benefit from heavily discounted registration fees for IIFC official conferences.

The new Executive Committee held a joint meeting with the Advisory Committee on December 9th where the work plan of the new Executive Committee and responsibilities of individual members were discussed.

Through several months' hard work prior to the conference, the Awards Selection Committee, coordinated by Professor L.C. Bank, selected four best papers from the high quality papers following a rigorous procedure. Professor Bank presented the awards at the conference dinner.

IIFC Fellows

The recognition of a small subset of the IIFC membership as Fellows is a distinct honor for "senior members of the Institute who have achieved a position of high responsibility and have contributed significantly to the advancement of the field through research or practice, or both." The IIFC currently has 12 members accorded the rank of Fellow of the IIFC.



Lawrence C. Bank is a Professor in the Department of Civil and Environmental Engineering at the University of Wisconsin in Madison. He is a registered Professional Engineer in the State of Wisconsin and the District of Columbia. He is

a Fellow of the American Society of Civil Engineers. Dr. Bank conducts research on the mechanics and design of composite material structures with an emphasis on applications to civil engineering. Dr. Bank has conducted research under the sponsorship of the National Science Foundation, the Federal Highway Administration, the US Navy, the US Army, the US Department of Transportation and private industry. He has authored numerous technical publications on composite materials and structures. Dr. Bank was the founding Editor of the ASCE Journal of Composites for Construction and is a member of technical committees of the American Concrete Institute and the American Society for Testing and Materials. Dr. Bank was recently elected Vice-President of the International Institute of FRP in Construction (IIFC). Dr. Bank received his B.Sc. degree cum-laude from the Technion in Israel in 1980, and his M.S. and Ph.D. degrees from Columbia University in New York City in 1982 and 1985, respectively. He has previously worked as a Structural Engineer with the firm of Skilling, Helle, Christiansen, Robertson in New York City (1980-1981), as a faculty member at Rensselaer Polytechnic Institute (1985-1988), and at The Catholic University of America (1988-1997).



Originally from Montréal, **Marie-Anne Erki** received her Ph.D. from the University of Toronto. She joined the Royal Military College of Canada in 1989; by 1995 she was Full Professor and Head of Civil Engineering. In

1989, Prof Erki joined the newly formed Technical Committee on the Use of Advanced Composites in Bridges and Structures of the Canadian Society for Civil Engineering, which published in 1991 and 1992 the world's first books on FRP for civil engineering, of which she was a contributor and co-editor. Prof Erki's research, which has earned her numerous awards and prizes, focuses on repairing damaged concrete structures with FRP and developing FRP bridges. While she has held many professional and technical appointments, Prof Erki is currently Editor of "New Materials in Construction" for *Progress in Structural Engineering and Materials* and Chair of the Editorial Committee of the Canadian Highway Bridge Design Code, as well as a member of its Technical Subcommittees on Fibre-Reinforced Structures and Wood Structures.



Dr Len Hollaway is Professor of Composite Structures in the School of Engineering - Civil Engineering, University of Surrey and is also visiting Research Professor at the University of

Southampton; he was one of the founding members of the IIFC. He has considerable research interests in advanced polymer composite systems and has been engaged on research into fibre/matrix composites for 35 years; his area of interest can be classified under three broad headings, namely, stress analysis, concept development and design guidelines. He has had published over 170 refereed technical papers and is the author or editor of eight books on various aspects of composites in the civil engineering industry.



Zhitao Lu, born on 4th November 1937 in Zhejiang province of China, is a Professor in Civil Engineering at Southeast University, Nanjing, China. He is also a Director of the Chinese Civil Engineering Society (CCES), Vice President of the Institute of Prestressed Concrete of the CCES. His research interests include concrete and prestressed concrete structures and applications of FRP composites in construction. He has published 7 books and over 140 scientific papers. His latest research in the latter area has laid the technical basis for the design and construction of the first CFRP cable-stayed bridge in China.

Professor Lu is a member of the Chinese Academy of Engineering. He has been awarded many honorary titles such as State Expert (1986), State Excellent Model Teacher (2001) and Award for Science and Technology of the Ho-Liang-Ho-Li Foundation (1999). He is also the recipient of 20 prizes including the Second Prize for Progress in Science and Technology from the State, First Prize for Progress in Science and Technology from the Ministry of Education, and First Prize for Progress in Science and Technology from Jiangsu Province. Professor Lu has successfully supervised about 50 PhD and 60 MSc students to completion.



Atsuhiko Machida is a Professor at the Department of Civil and Environmental Engineering, Saitama University, Japan. He received his B. Eng, M. Eng and D.Eng from the University of Tokyo, Japan,

in 1963, 1965 and 1976 respectively. After his graduation he worked for Saitama University for more than 30 years, and recently he served four years as the Dean of Faculty of Engineering and the Vice President. He has been working also as a member or a chairman of many research committees on concrete engineering in JSCE (Japan Society of Civil Engineers) and JCI (Japan Concrete Institute). His research interests include use of FRP for concrete structures, seismic resistant design of reinforced concrete structures and steel-concrete hybrid structures.



Professor Urs Meier is currently deputy director general of the United Swiss Federal Laboratories for Materials Testing and Research (EMPA) with 820 co-workers in Dubendorf-Zurich, Switzerland. He is also associated member of

the Department of Materials Science of the Swiss Federal Institute of Technology (ETH) in Zurich. Urs Meier has accomplished much in the application of advanced composites in civil engineering during the past 25 years and has received worldwide recognition for his pioneering work. Especially noteworthy is the post-strengthening of civil structures with carbon fiber reinforced polymer strips, which has been successfully implemented at a growing rate worldwide and the CFRP stay- and post-tensioning cables. He has received a number of prizes and awards for his R&D-contributions.



Dr. Aftab A. Mufti is a Professor of Civil Engineering at the University of Manitoba, Winnipeg, Manitoba, Canada. He is also the Program Leader and President of the ISIS Canada Research Network, a Network of Centres of

Excellence, and the President of ISHMII (International Society for Health Monitoring of Intelligent Infrastructures). His research interests include FRPs, FOSs, FEM, bridge engineering, structural health monitoring and civionics. He has authored or co-authored nine books and more than 200 technical publications. Dr. Mufti is the recipient of 16 awards. He is the holder of several patents on the steel-free bridge deck concept, of which he is the principal developer. In addition, he is the Chair of the Technical Subcommittee of the Canadian.

Highway Bridge Design Code that has recently completed developing code clauses to design, rehabilitate and repair structures using fibre reinforced.



Dr. Nanni is the Vernon and Maralee Jones Professor of Civil Engineering at the University of Missouri-Rolla and holds a professorship at the University of Naples Federico II. He is a structural engineer interested in construction materials, their structural performance,

and field application. In the past 19 years, he has obtained experience in concrete and advanced composites-based systems as the principal investigator of projects sponsored by federal and state agencies and the private sector. Dr. Nanni has maintained a balance between academic and practical experience. He is an active member in the technical committees of ACI (Fellow), ASCE (Fellow), ASTM and TMS. In 2004, he was elected Founding Fellow of IIFC. He was the founding Chairman of ACI Committee 440 - FRP Reinforcement and is the current Chairman of ACI Committee 437 – Strength Evaluation. Dr. Nanni is the Editor-in-Chief of the ASCE Journal of Materials in Civil Engineering. He was the editor of a book on the subject of FRP reinforcement for concrete and co-edited the proceedings of several International Symposia and Workshops on the same subject. Among his honors, Dr. Nanni was recognized with the Engineering News-Record Award of Excellence for 1997 (Top 25 Newsmakers in Construction).



Sami H. Rizkalla, Ph.D. is an elected Fellow of the American Concrete Institute (ACI); Fellow, American Society of Civil Engineering (ASCE); Fellow, Canadian Society for Civil Engineering (CSCE); Fellow, The

Engineering Institute of Canada (EIC); Fellow, International Institute for FRP in Construction (IIFC). He is currently a Distinguished Professor of Civil Engineering and Construction, Director of Constructed Facilities Laboratory, Department of Civil Engineering, North Carolina State University. Director, NSF I/UCRC – Repair of Buildings and Bridges with Composites, North Carolina State University; Immediate past Chair of ACI Committee 440 “FRP Reinforcements”; Immediate past

President and Scientific Director of the Canadian Networks of Center of Excellence “Intelligent Sensing for Innovative Structures”; Regional Editor, Elsevier Science “Construction and Building Materials” Journal; Member, Editorial Board, ASCE “Composite for Construction” Journal; Member, Advisory Board, Journal of Advanced Concrete Technology, Japan .



Luc R. Taerwe obtained his civil engineering degree at Ghent University (Belgium) in 1975, his Master degree in Structural Mechanics in 1976 and his Ph.D. degree in 1985. In 1988, he received the Robert L’Hermite Medal of

RILEM (International Union of Testing and Research Laboratories for Materials and Structures) and in 1991 the IABSE Prize (International Association for Bridge and Structural Engineering). In 2001 he became a fellow of the American Concrete Institute (ACI). Actually, he is a full professor of concrete structures at Ghent University, head of the Department of Structural Engineering and director of the Magnel Laboratory for Concrete Research. He also is a convenor of several committees in fib (international federation for structural concrete), chairman of the “Concrete” committee of the Belgian Standards Institute and member of the editorial board of several international journals. His research interests include non-linear analysis of concrete structures, statistical aspects of conformity control, structural reliability, FRP reinforcement, monitoring, non-destructive testing and fire resistance. He is the author or co-author of more than 300 journals and conference papers.



Dr. Jin-Guang Teng is Chair Professor of Structural Engineering at The Hong Kong Polytechnic University. He was the founding President of IIFC and was re-elected President of IIFC at the CICE

2004 conference for a second term. He was also Chairman of the first CICE conference (CICE 2001) held in Hong Kong, which has now evolved into the IIFC official conference series.

Dr. Teng is the Editor-in-Chief of the international journal *Advances in Structural Engineering* and a member of the editorial boards of 4 other international journals. Dr. Teng's research interests include the application of FRP in construction, steel structures, and shell structures. His publications include the book "[*FRP-Strengthened RC Structures*](#)" (John Wiley and Sons, 2002), over 120 refereed journal papers and over 130 conference papers. He has received a number of prizes and awards for his research contributions. In the FRP area, his research has been focused on understanding the failure mechanisms of RC structures strengthened with externally bonded FRP reinforcement for the development of theoretical models for use in design. More recently, he has embarked on research exploring the use of FRP in new construction, particularly when in combination with traditional materials.



Ueda Tamon is a professor at Division of Structural and Geotechnical Engineering of Hokkaido University. He obtained his Doctor of Engineering from University of Tokyo in 1982. He worked at University of Washington, University of

Tokyo and Asian Institute of Technology before joining Hokkaido University in 1991. His research interests are in numerical analysis of concrete and hybrid structures, prediction of chronological change in structural performance, upgrading of structures, seismic design, and structural design methodology. He has been carrying out studies on interface modeling for externally bonded FRP reinforcement and application of fiber with high fracturing strain. He is a member of *fib*, IABSE, ICCMC, IIFC, JSCE, JCI and JPCEA. Dr Ueda is currently Chairman of ICCMC (International Committee on Concrete Model Code for Asia), Vice-President of IIFC (International Institute of FRP in Construction) and Secretary of ISO/TC71/SC7 (Maintenance and Repair of Concrete Structures).

Report on CICE-2004

By all accounts CICE 2004 was a resounding success. A brief report is given below by the Conference Chairman.

Conference Chairman's Report on CICE 2004

by

Dr Rudolf Seracino

The University of Adelaide, Australia

rseracin@civeng.adelaide.edu.au

The initial stages of planning for CICE 2004 commenced in early 2003 and soon thereafter the CICE conference series became the official conference of the IIFC. Support for the conference by the international community was strong with the call for abstracts resulting in 152 submissions. After an initial review, 147 abstracts were accepted, which resulted in 118 full-length papers being submitted. All papers underwent a rigorous review process by two expert reviewers selected from the CICE 2004 International Advisory Committee and the Organising Committee. Consequently, 111 papers were selected for publication in the conference proceedings. Ninety-six delegates, representing over 20 countries, attended the conference in Adelaide, Australia.

The conference began with a welcome reception on Tuesday 7 December, and provided the opportunity to renew old acquaintances prior to the commencement of the technical program. The 3-day technical program, which commenced on Wednesday 8 December, consisted of 8 keynote lectures given by eminent researchers, 4 special sessions co-organised by invited speakers, and two parallel sessions for the presentation of contributed papers. To the credit of the authors and presenters, the quality of the papers and presentations were of an outstanding quality.

As the CICE conference series is the official conference of the IIFC, CICE 2004 hosted the first IIFC General Meeting, which was open to all of the conference delegates. The president of the IIFC, Prof J.G. Teng, addressed the delegates and an important outcome of the meeting was the election of three new IIFC council members: Prof C.E. Bakis, The Pennsylvania State University, USA; Dr. M. Motavalli, Laboratory

Leader at EMPA, Switzerland & University of Tehran, Iran; and Prof X.L. Zhao, Monash University, Australia. A meeting of the IIFC Council and a combined meeting of the IIFC Executive and Advisory Committees were also held. A number of decisions were made including the election of three new IIFC Fellows: Prof L.C. Bank, University of Wisconsin-Madison, USA; Prof. J.G. Teng, The Hong Kong Polytechnic University, Hong Kong, China; and Prof T. Ueda, Hokkaido University, Japan.

At the conclusion of the technical program, on Friday 10 December, the conference dinner was held in the Ballroom of the Radison Playford Hotel. In addition to some good food and drink, a number of speeches and presentations were made throughout the evening, which included a demonstration by a local Aboriginal dance group. Gifts of appreciation were presented to the keynote speakers and for the first time in the CICE conference series, 4 best paper awards, sponsored by the IIFC, were presented. The door prize, an opal pendant and necklace generously donated by Opals Australia, was won by Dr R. Thamrin. After a late night, delegates and partners woke up early the next morning to take part in the tour of the Barossa Valley, one of Australia's famous Wine regions. The day tour included wine tasting, sightseeing, and the opportunity to do some souvenir shopping.

Even though it is now some months since the conference, work related to CICE 2004 continues. An agreement with the ASCE to publish a special issue of the Journal for Composites in Construction was recently finalised. After suitable extension, selected papers have been invited for review and possible publication in the special issue. A tight time-line has been established and the special issue is due for publication early 2006. Work is also commencing on the CICE 2004 special issue of the Construction and Building Materials Journal.

Although not everything went as well as planned, I am pleased that the majority of the comments and feedback received were positive. I hope that both the technical and social aspects of the conference were rewarding for all. However, even as the conference chairman, I cannot take credit for the success of CICE 2004 as it would not have been possible without the tremendous efforts of many people and

organisations behind the scenes. I extend my heartfelt gratitude and appreciation for: the support and advice of the IIFC committees and in particular, Prof J.G. Teng; the support of the Organising Committee and especially the commitment of the administrative staff of the School of Civil and Environmental Engineering at The University of Adelaide; the support of the conference sponsors and the professionalism of the publisher of the proceedings, and; my family who not only endured many stressful times, but also contributed significantly to the completion of many tasks.

Finally, I must thank all of the delegates for their support and contribution to the success of CICE 2004. Being chairman of CICE 2004 was an extremely rewarding experience and it was an honour to host the conference. I extend my best wishes and support to Prof A. Mirmiran, chairman of CICE 2006. I am sure it will be a tremendous success and I look forward to meeting everyone in Florida.



CICE 2004 – Best Papers

by
Prof. Larry Bank
Chair of Awards Committee

Best Paper awards were presented in four categories at the Second International Conference on FRP Composites in Civil Engineering (CICE 2004) held in Adelaide Australia from the 8-10 December 2004. The authors of each paper received a certificate and a check for US\$200. The papers and the categories are as follows:

The BEST PAPER for Research on FRP Composites for Structures was awarded to P. Feng, L.P. Ye, R. Bao and J.G. Teng for the

paper entitled Development and analysis of the large-span FRP woven web structure.

The BEST PAPER for Research on Strengthening with FRP Composites was awarded to A. Kitano, O. Joh and Y. Goto for the paper entitled Experimental study on the strengthening and repair of R/C wall-frame structures with an opening by CF-sheets or CF-grids.

The BEST PAPER for Research on Flexural Strengthening with FRP Composites was awarded to T. Shimomura and K. Maruyama for the paper entitled Durability of reinforced concrete structures with externally bonded FRP sheets.

The BEST PAPER for Application of FRP Composites in Structures was awarded to B. Täljsten and A. Hejll for the paper entitled CFRP strengthening and monitoring of the Gröndals bridge in Sweden.

Copies of these papers have been posted on the IIFC web page, and abstracts of each are provided in this issue of the newsletter.

The best papers were selected by a committee consisting of Profs. Bank (Chair), Ueda, Rizkalla, Hollaway and Seracino. Subcommittees were appointed in each of the categories.

Best Paper for Research on FRP Composites for Structures

Development and Analysis of the Large-Span FRP Woven Web Structure

by

P. Feng, L.P. Ye & R. Bao

Department of Civil Engineering, Tsinghua University, Beijing, China

J.G. Teng

Department of Civil and Structural Engineering, The Hong Kong Polytechnic University, Hong Kong, China

“An innovative large-span structural system, namely the FRP woven web structure (FRPWWS), is introduced in this paper. In an FRPWWS, the high-strength FRP strips are “woven” like bamboo strips in a Chinese

bamboo mat to form a plane web. The outer edge of the web is anchored on an outer ring beam, and an inner ring beam is provided to anchor the FRP strips at the center of the web. The stiffness of the web to resist various loads is derived from the initial prestressing during the “weaving” stage and the additional tensioning as a result of the out-of-plane movement of the inner ring beam. As a result of the high strength-to weight ratio of FRP, this new structural form offers an attractive option for the construction of spatial structures with spans longer than are possible with conventional structural materials. In this paper, the basic layout and construction procedure for a simple FRPWWS is first presented. Three basic weaving patterns are next explained. Several variations of the basic structural system are also proposed. A simple mechanical model is presented for the deformation of individual FRP strips. Results from a finite element analysis of an example structure are also given. The results of these analyses confirm the feasibility of the FRPWWS.”

Best Paper for Research on Strengthening With FRP Composites

Experimental Study on the Strengthening and Repair of R/C Wall-Frame Structures with an Opening by CF-Sheets or CF-Grids

by

A. Kitano, O. Joh & Y. Goto

Graduate School of Engineering, Hokkaido University, Sapporo Japan

“In this study, the first story in a multi-storied reinforced concrete structural wall with openings was strengthened using carbon fiber sheets (CF sheets) and carbon fiber grids (CF grids). The effect of shear reinforcement and repair on earthquake resisting behavior were examined with a horizontal forcing experiment for several specimens having different opening positions and opening shapes. The maximum strength and deformability were improved by the CF grid reinforcement of the wall irrespective of opening positions, etc. The deformability was greatly improved by establishing vertical slits in the wall at the four corners of the opening, and reinforcing the columns and sleeve walls using CF sheets. It was possible to evaluate approximately the ultimate flexural and shear

capacities of the test specimens in which the reinforcement method differs, by correlating with the fracture modes.”

Best Paper for Research on Flexural Strengthening with FRP Composites

Durability of Reinforced Concrete Structures with Externally Bonded FRP Sheets

by
T. Shimomura & K. Maruyama
Nagaoka University of Technology, Niigata, Japan

“This study focuses on long-term performance of reinforced concrete structures with externally bonded FRP sheet, which is carbon or aramid textile bonded with epoxy resin. Laboratory tests were carried out to investigate the durability aspect of concrete member retrofitted with FRP sheet. It was experimentally verified that the FRP sheet can reduce chloride ingress into concrete. Diffusivity of chloride ions in the layer of FRP sheet was identified by the numerical analysis of the test results. It was clarified that FRP sheet can improve mechanical performance of deteriorated concrete members due to reinforcement corrosion and associated concrete crack. Consequently, retrofit of FRP sheet is effective to improve durability, i.e. to extend service-life, of existing concrete structures.”

Best Paper for Application of FRP Composites in Structures

CFRP Strengthening and Monitoring of the Gröndals Bridge in Sweden

by
B. Täljsten
Department of Civil Engineering Lulea University of Technology, Sweden and
A. Hejll
EMPA Structural Engineering Research Laboratory Switzerland

“The Gröndal Bridge, is a large freivorbau bridge (pre-stressed concrete box bridge), approximately 400 meters in length with a free span of 120 m. It was opened to tram traffic in 2000. Just after opening cracks were noticed in

the webs, these cracks have then increased, the size of the largest cracks exceeded 0.5 mm, and at the end of 2001 the bridge was temporarily strengthened. This was carried out with externally placed prestressed steel stays. The reason for cracking is still debated and will be further discussed in this paper. Nevertheless, it was clear that the bridge needed to be strengthened. The strengthening methods used were CFRP laminates in the Service Limit State (SLS) and prestressed dywidag stays in the Ultimate Limit State (ULS). The strengthening was carried out during 2002. At the same time monitoring of the bridge commenced, using LVDT crack gauges as well as optical fibre sensors. To date, a large amount of data has been collected and the data is still under evaluation. Primary results show that the largest stress can be referred to the temperature load and that the contribution from the live load is minor. The results from the monitoring show that the CFRP laminates work as intended and that the cracks are not propagating.”

Next CICE Conference

The next CICE conference will be held in Miami, Florida in 2006 and will be chaired by Prof. Amir Mirmiran. Plans are already underway for what promises to be a very well run and stimulating conference.

The Third International Conference on FRP Composites in Civil Engineering is planned for December 2006 in Miami, FL, USA. The Florida International University and the City of Miami will be hosting this bi-annual event. The conference provides an international forum for researchers and practitioners to exchange ideas and communicate recent advances on the application of FRP composites in civil engineering. Theme of the conference will be FRP Composites in Civil Engineering: From Research To Practice, and it will cover strengthening and repair, new construction, hybrid systems, durability, design codes and guidelines, smart structures, among others. Florida Department of Transportation will showcase its series of bridges in South Florida that have been repaired and retrofitted with FRP. South Florida is filled with cultural and tourist attractions, and for the adventurers, Disney World and the Keywest are within driving

distance. A pre-conference workshop on repair of concrete bridges using FRP is being arranged. Also, a one-day post-conference cruise to the Bahamas is being planned. For additional information, please contact Conference Chairman, Dr. Amir Mirmiran, Professor and Chair, Department of Civil and Environmental Engineering, Florida International University, Miami, FL 33174, Tel: (305) 348-2314, fax (305) 348-2802, email: mirmiran@fiu.edu.



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