

The Third Asia-Pacific Conference on FRP in Structures

APFIS 2012

Final Program



Hokkaido University, Sapporo, Japan
2-4 February 2012



The Official Regional Conference of the International Institute for FRP in
Construction (IIFC) for the Asia-Pacific Region

Organized by



Japan Concrete Institute

In collaboration of



Hokkaido University



Japan Society of Civil
Engineers



Japan Society for
Composite Materials

Welcome to APFIS2012 in Sapporo

APFIS2012 is the third IIFC Asia-Pacific regional conference on the research and application of fiber reinforced polymers (FRP) in civil and architectural engineering structures to be held in Sapporo, Japan from 2 to 4 February 2012. APFIS2012 aims to continue the success of the preceding conferences held in Hong Kong, China in 2007, and Seoul, Korea in 2009 with expecting participation from the Asia-Pacific region and various parts of the world.

APFIS2012 includes 6 keynote and 66 general papers as well as 11 posters. The first authors of 42 papers are from Asia, while 12 papers each are from Oceania and North America and 6 papers from Europe with the biggest contribution, 22 papers from the host country, Japan. Presentations are made either in the technical session or in the poster session. Some of the poster presentations do not have full papers in the proceedings. Topics of the papers cover issues covering strengths (material, anchorage and member), bond, confinement and durability. Structural types dealt with in the papers are not only concrete but also steel and FRP. Hybrid structures and materials using FRP are also the major interests in the papers.

APFIS2012 will be held at Conference Hall, Hokkaido University. Hokkaido University started out in 1876 as Sapporo Agricultural College, the first modern academic institute in Japan. Since the Japanese government's purpose of setting up SAC was to develop Hokkaido, an untamed land, using the advanced knowledge of foreign faculty and subsequently SAC graduates, civil engineering education in Japan started in earnest at SAC.

Sapporo is the fifth largest city of Japan with a population of more than 1.8 million. It developed as the main urban center of Hokkaido, the northern island of Japan and became well known internationally when in 1972 it became the first Asian city to host the Winter Olympics. Sapporo is also famous for its annual Snow Festival, in which massive ice sculptures adorn Odori Park in the city center. We scheduled this conference to coincide with this event so that participants can experience spectacular snow structures.

Looking forward to seeing you at Sapporo!

APFIS2012, Organizing Committee,
Chairman



Tamon Ueda
Professor, Hokkaido University

Riyad S. Aboutaha, Rafic G. El-Helou, Manar S. Shraideh

F2A02 Investigation of Flexural Performance of RC Beams Strengthened with CFRP Textiles and Cement Based Adhesives

Siavash Hashemi Riadh Al-Mahaidi

F2A03 Strengthening of Flat Plates with An Opening Using FRP Systems
Kiang Hwee Tan

F2A04 Effectiveness of A New CFRP Anchor in Preventing Delamination
Ahmed A.B. Mostafa, A. Ghani Razaqpur

F2A05 Behavior of Laterally Restrained GFRP Reinforced Concrete Slab
Yu Zheng, Chunhong Li, Guoyou Yu

Session F2B (11:00-12:40)

Room B

Title : Durability and long-term performance / Strengthening of concrete, metallic, timber and masonry structures

Chair : **Prof. R. El-Hacha (University of Calgary, Canada) and Dr. J.G. Dai (Hong Kong Polytechnic University, China)**

Room : Room B (Small Lecture Room)

F2B01 Fatigue of Center Cracked Steel Plates with UHM CFRP Plate Strengthening
Chao Wu, Xiaoling Zhao, Wenhui Duan, Mohammad R. Emdad, Riadh Al-Mahaidi

F2B02 Enhancement of Mechanical Performance of Steel/CFRP Adhesively-Bonded Joints at Elevated Temperatures through Carbon Nanotube Modification and Curing
Yu Bai, Tien C. Nguyen, Chao Ding, Xiao-Ling Zhao

F2B03 Improving Fatigue Performance of CFRP Strengthened Steel Beams by Applying Vacuum Pressure in the Wet Layup of CFRP Woven Sheets
Hui Jiao, Xiao-Ling Zhao, Fidelis Mashiri

F2B04 Development of Reduction Technique of Thermal Stress Induced in CFRP Bonded Steel Plates
Toshiyuki Ishikawa, Atsushi Hattori, Hirotaka Kawano, Takashi Nagao, Akira Kobayashi

F2B05 Mechanical Characteristics of CFRP Reinforcement for Corroded Steel under Axial Tension
Yukihiro Matsumoto, Nguyen Duc Long, Seishi Yamada, Takahiro Matsui

Lunch (12:40-14:00)

Session F3A (14:00-15:40)

Room A

Title : Hybrid structures and all FRP structures

Chair : **Prof. K.H. Tan (National University of Singapore, Singapore) and Dr. P. Feng (Tsinghua University, China)**

Room : Room A (Large Lecture Room)

F3A01 Prediction of The Flexural Behavior of Fibre Composite Sandwich Beams
Allan C. Manalo, Thiru Aravinthan, Karu Karunasena

F3A02 Performance of Newly Developed CFRP Precast Prestressed Decked Bulb T Beams
Nabil Grace, Tsuyoshi Enomoto, Prince Baah, Mena Bebawy

F3A03 Effects of the Material Constants of Bond on Stress Distributions for FRP/ALC Sandwich Slabs
Seishi Yamada, Takeshi Seino, Yukihiro Matsumoto, Hideo Oka

F3A04 The Use of FRCC and FRP for the Joining Method of Permanent Formwork
Qingxu Jin, Christopher K. Y. Leung

F3A05 Structural Behavior of Composite Girders Consisting of Hybrid FRP I-Beam and Precast Ultra High Performance Fiber Reinforced Concrete Slab
Hiroshi Mutsuyoshi, Nguyen Duc Hai, Zhishen Wu

Session F3B (14:00-15:40)

Room B

Title : Durability and long-term performance / Hybrid structures and all FRP structures

Chair : **Prof. C.K.Y. Leung (HKUST, China) and Dr. I. Nishizaki (Public Works Research Institute, Japan)**

Room : Room B (Small Lecture Room)

F3B01 Influence of Environmental Temperature for Bond Strength between CFRP Sheet and Concrete

Yasuhiro Koda, Akihisa Kamiharako, Ichiro Iwaki

F3B02 Effect of Adhesive Viscoelasticity on the Creep Behaviour of FRP Strengthened Concrete Beams

Ehab Hamed

F3B03 Durability of Aramid and Carbon FRP PC Beams under Tidal and Thermal Accelerated Exposure

Hiroshi Nakai, Hirofumi Watanabe, Tsuyoshi Enomoto, Taketo Uomoto

F3B04 Imperfection Influence on FRP-Plated RC Beams

Y.C. Guo, G.M. Chen, L.J. Li, F. Liu, B. Yuan, F.M. Ren, P.Y. Huang

F3B05 Fatigue Performance of Hybrid CFRP-GFRP-UHPC Beams

Donna S.M. Chen, Raafat El-Hacha

Coffee Break (15:40-16:00)

Keynote Lectures (16:00-18:15)

Room A

Chair : **Prof. Z.S. Wu (Ibaraki University, Japan)**

Room : Room A (Large Lecture Room)

Key04 Proposals of CF, GF and NF Composites to Civil and Architectural Structures

Prof. Goichi Ben

Key05 All FRP and FRP-Concrete Hybrid Components for Bridges: Experiments, Theories and Case Study

Dr. Peng Feng

Key06 **Research and Development of Fibre Composites in Civil Infrastructure – The Australian Experience**

Dr. Thiru Aravinthan

Banquet (19:00-)

The Sapporo Beer Garden

Venue : The Sapporo Beer Garden

Saturday 4th February, 2012

Registration (8:30-9:30)

Hall

Room : Hall

Session S1A (9:00-10:40)

Room A

Title : Confinement and seismic retrofit

Chair : **Dr. Y.F. Wu (City University of Hong Kong, China) and Dr. K. Yonemaru (Shimizu Corporation, Japan)**

Room : Room A (Large Lecture Room)

S1A01 Size Effect of Square Concrete Columns Confined with CFRP Wraps

Zhenyu Wang, Daiyu Wang, Scott Thomas Smith

S1A02 Shear Strengthening of Full-Scale RC T-Beams with CFRP Sheets

Abdeldjelil Belarbi, Michael Murphy, Sang-Wook Bae

S1A03 Shear Strengthening of RC Beams Using Hybridized FRP Composite

Sang-Su Ha, Dong-Uk Choi, Thomas H.-K. Kang, Chin Yong Lee

S1A04 Short Term Creep Tests of Low Strength Rectangular Concrete Members Jacketed with Carbon FRP Sheets

Cem Demir, Aygul Aydogmus, Alper Ilki

Session S1B (9:00-10:40)

Room B

Title : Bond behavior and debonding failures

Chair : **Prof. S.H. Rizkalla (North Carolina State University, USA) and Dr. T. Kanakubo (University of Tsukuba, Japan)**

Room : Room B (Small Lecture Room)

- S1B01 Bond and Force Transfer of FRP Materials Bonded to Concrete Using Sitecure System
Rebecca J. Gravina, S. Ali Hadigheh, Sujeeva Setunge
- S1B02 Bonding of Varying-Thickness FRP Laminates to RC Beams
P. Fakhrimoghadam, A. Vafai
- S1B03 Bond Properties between Continuous Fiber Rope and Concrete
Kenzo Sekijima, Kyouhei Kawakami, Junichi Izumo
- S1B04 Bond Strength of Carbon and Aramid Fiber Reinforced Polymer Rebars in Normal Strength Concrete
So Jeong Han, Dae-Jin Kim, Young Hak Lee, Heecheul Kim
- S1B05 Investigation of the Bond Behavior for the Embedded Through-Section FRP Rod Shear-Strengthening Method
Ahmed Godat, Amar L'hady, Omar Chaallal, Kenneth W. Neale

Coffee Break (10:40-11:00)

Session S2A (11:00-12:20)

Room A

- Title : Hybrid structures and all FRP structures / Strengthening of concrete, metallic, timber and masonry structures / Durability and long-term performance
- Chair : **Dr. T. Matsumoto (Hokkaido University, Japan) and Prof. A. Belarbi (University of Houston, USA)**
- Room : Room A (Large Lecture Room)

- S2A01 Analysis and Design of Perforated SIFCON Blocks for Compression Yielding Structural Systems
Yufei Wu, Jiafei Jiang, Kang Liu
- S2A02 Improvement of Debonding Bending Moment of Pre-Tensioned CFRP Plates Bonded onto Steel Members
Masaru Shimizu, Toshiyuki Ishikawa, Atsushi Hattori, Hirotaka Kawano
- S2A03 **Mechanical Behaviour of A New Type of Fibre Composite Railway Sleeper**
Allan C. Manalo, Thiru Aravinthan
- S2A04 Gravimetric Experimental Study on Moisture Diffusion Characteristic of Pultruded FRP Composite and Adhesive Materials
Xu Jiang, Henk Kolstein, Frans S.K. Bijlaard

Session S2B (11:00-12:20)

Room B

- Title : Bond behavior and debonding failures
- Chair : **Dr. A. Kamiharako (Hirosaki University, Japan) and Dr. D. Zhang (Hokkaido University, Japan)**
- Room : Room B (Small Lecture Room)

- S2B01 Practical-Orientated Full-Scale Tests in Comparison with Bond Checks of Different Guidelines
Wolfgang Finckh, Konrad Zilch
- S2B02 Double Shear Tests for Characterisation of Bond between FRP EBR and Concrete
Andreea Serbescu, Maurizio Guadagnini, Kypros Pilakoutas
- S2B03 Interface Bond Strength of Helical Wrapped GFRP Ground Anchors
Weichen Xue, Yuan Tan
- S2B04 A Study on Flexural Bonding Strength for Embedded Length of FRP Rods
J. Sim, T. Kang, J. Park, H. Kim, H. Lee

Closing Ceremony (12:20-12:40)

Room A

Lunch (12:40-14:00)

Committee Members

International Scientific Committee

R. Al-Mahaidi, Australia	T. Uomoto, Japan
T. Aravinthan, Australia	H. Mutsuyoshi, Japan
M. Griffith, Australia	H. Nakamura, Japan
X.L. Zhao, Australia	J. Sim, Korea
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A. Fam, Canada	A. Ilki, Turkey
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P. Feng, China	M. Guadagnini, UK
S.T. Smith, China	T.J. Stratford, UK
Y.F. Wu, China	S.H. Rizkalla, USA
H.M. Seliem, Egypt	A. Nanni, USA
E. Ferrier, France	C.E. Bakis, USA
T.C. Triantafillou, Greece	L.C. Bank, USA
M. Motavalli, Iran	I.E. Harik, USA
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L. De Lorenzis, Italy	F. Matta, USA
A. Machida, Japan	R. Seracino, USA

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I. Nishizaki, Public Works Research Institute

Y. Takahashi, Hokkai-Gakuen University

F. Taguchi, Civil Eng. Research Institute for Cold Region

Z. Wu, Ibaraki University

K. Yamaguchi, Kyushu University

S. Yamada, Toyohashi University of Technology

K. Yonemaru, Shimizu Corporation