

FraMCoS-7 Program-final0

7th International Conference on Fracture Mechanics of Concrete and Concrete Structures (FraMCoS-7)



<http://www.framcos7.org>



Conference Date: May 23 ~ 28, 2010

Conference Venue: Seogwipo KAL Hotel, Jeju, Korea

Please visit the conference website for registration and accommodation.
Online registration is convenient through website. <http://www.framcos7.org>

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♣ Introduction

The IA-FraMCoS (International Association of Fracture Mechanics for Concrete and Concrete Structures) was founded in 1992 in USA to promote and advance the theoretical and experimental aspects of fracture mechanics and cracking of concrete structures. The activities of IA-FraMCoS provide great advances on new technological development in concrete materials and concrete structures. Among the important roles of IA-FraMCoS, the primary role is to hold the international conferences on a triennial basis to communicate and compile recent advances on the related subject areas. The FraMCoS-7 is the seventh international conference on fracture mechanics for concrete and concrete structures which will be held during May 23~28, 2010 in Seogwipo-city, Jeju, Korea. The FraMCoS-7 Conference is organized by IA-FraMCoS and sponsored by Korea Concrete Institute. It is also scientifically supported by internationally-renowned concrete societies including ACI, RILEM, JCI, and ACBM.

♣ Conference Topics

The major topics for FraMCoS-7 conference are as follows:

- A. Recent advances in fracture mechanics of concrete
- B. Fracture and cracking behavior of reinforced and prestressed concrete structures
- C. High-performance and high strength concretes
- D. Fiber reinforced cementitious composites and FRC
- E. Advancement in structural design codes
- F. Structural monitoring and assessment
- G. Repair, strengthening, and retrofitting
- H. Durability and corrosion-induced cracking
- I. Interface fracture and debonding phenomena
- J. Constitutive relations, time-dependent effects, bond, cyclic and fatigue behavior, thermal, impact behavior
- K. Brick masonry, concrete-like and quasi-brittle materials (rocks, soils, ceramics, refractory, asphalt, ice, etc.)
- L. Practical Applications of Fracture Mechanics

Besides the FraMCoS traditional topics related to concrete and reinforced concrete, concrete-like and quasi-brittle materials may also be considered, when the related experimental methods and theoretical/numerical models are analogous to those utilized for concrete

♣ History of Previous FraMCoS Conferences

The series of International Conferences on Fracture Mechanics of Concrete and Concrete Structures (FraMCoS) has taken place in different parts of the World on a triennial basis. The previous FraMCoS conferences were so successful in that several hundreds eminent experts have participated in each conference from universities, research institutes, industries and public organizations from all over the world. The previous conferences of the series were successfully held as follows.

FraMCoS-1 1992 Breckenridge, Colorado (USA)

FraMCoS-2 1995 Zürich (Switzerland)

FraMCoS-3 1998 Gifu (Japan)

FraMCoS-4 2001 Cachan-Paris (France)

FraMCoS-5 2004 Vail, Colorado (USA)

FraMCoS-6 2007 Catania (Italy)

♣ Sponsors

Organized by

International Association of Fracture Mechanics for Concrete and Concrete Structures (IA-FraMCoS)

With the Main Sponsor of

Korea Concrete Institute (KCI)

With the International Scientific Support of

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FraMCoS-7 Program At A Glance

May 23 (Sunday)	May 24 (Monday)	May 25 (Tuesday)	May 26 (Wednesday)	May 27 (Thursday)	May 28 (Friday)
	08:30 – 18:00 Registration	08:30 – 18:00 Registration	08:30 – 18:00 Registration	08:30 – 18:00 Registration	
	09:00 – 09:20 Opening Ceremony 09:20 – 10:50 Plenary Session Plenary I- Prof. Z. P. Bazant Plenary II- Prof. F. H. Wittmann	09:00 – 10:30 Plenary Session Plenary III- Prof. S. P. Shah Plenary IV- Prof. A. Carpinteri	9:00 – 10:30 Parallel Sessions 7A : Fracture Energy & Strength 7B : (OS) Computational Modeling 7C : LCM and Durability 7D : (OS) Shrinkage-Induced Cracking 7E : Strength, Damage, Fracture Tests	09:00 – 10:30 Plenary Session Plenary V- Prof. H. W. Reinhardt Plenary VI- Prof. K. Rokugo	
	10:50 – 11:20 Coffee Break	10:30 – 11:00 Coffee Break	10:30 – 11:00 Coffee Break	10:30 – 11:00 Coffee Break	
	11:20 – 12:50 Parallel Sessions 1A : Fracture Energy & Toughness 1 1B : Softening and Micromechanics 1C : (OS) Dynamic Fracture 1D : (OS) Discrete Modeling 1 1E : Behavior of Anchors and Studs	11:00 – 12:48 Parallel Sessions 4A : Fracture Energy & Cracking 4B : (OS) From Damage to Fracture 4C : Fiber Reinforced Concrete 2 4D : (OS) Discrete Modeling 2 4E : (OS) Corrosion-Induced Cracking 1	11:00 – 12:48 Parallel Sessions 8A : Interface Behavior & Bond 8B : Constitutive Relations, Deep Beam 8C : (OS) Testing on SHCC 8D : High Performance Concrete 1 8E : Strength and Fracture Tests	11:00 – 12:48 Parallel Sessions 9A : Repair and Strengthening 9B : Damage Estimation 9C : (OS) Application of Adv. FRC Mat. 9D : High Performance Concrete 2 9E : Impact, Dynamic, Blast Response	
	12:50 – 14:00 Lunch I	12:50 – 14:00 Lunch II	12:50 – 14:00 Lunch III	12:50 – 14:00 Lunch IV	
	14:00 – 15:48 Parallel Sessions 2A : Modeling Cracks and Fracture 1 2B : FEM & Discrete Elem. Analysis 1 2C : Size and Scale Effects 2D : Creep and Shrinkage 2E : Permeability and Resistivity	14:00 – 15:48 Parallel Sessions 5A : Cracking, Crack Extension 5B : (OS) Fracture Proc. Monitoring 1 5C : Fiber Reinforced Concrete 3 5D : Monitoring, Sensors, Splices 5E : (OS) Corrosion-Induced Cracking 2	14:00–18:30 Outdoor Technical Visit	14:00 – 15:30 Parallel Sessions 10A : Bonding, Debonding Phenomena 10B : RC and PSC Structures 10C : SHCC, Bond, Damping, 10D : Cyclic & Ultimate Behavior 10E : Fire, Temperature, Fatigue	
15:30 – 20:00 Registration (1 st Floor Foyer at Seogwipo KAL Hotel))	15:48 – 16:18 Coffee Break	15:48 – 16:18 Coffee Break		15:30 – 16:00 Coffee Break	
18:00 – 20:00 IA-FraMCoS Board of Directors and Advisory Board Meeting	16:18 – 18:06 Parallel Sessions 3A : Modeling Cracks and Fracture 2 3B : FEM & Discrete Elem. Analysis 2 3C : Fiber Reinforced Concrete 1 3D : Bond and Bond-Slip Behavior 3E : ASR and Durability	16:18 – 18:06 Parallel Sessions 6A : Cracking, Crack Width 6B : (OS) Fracture Proc. Monitoring 2 6C : Fiber Reinforced Concrete 4 6D : Behavior of SHCC (HPFRCC) 6E : Corrosion and Cracking		16:00–17:00 IA-FraMCoS General Assembly	
	18:30 – 20:30 Welcome Reception	18:30 – 21:00 IA-FraMCoS Board of Directors and Advisory Board Meeting		18:30 – 21:30 Banquet	

Post-
Conference
Workshop on
High
Performance
Concrete
09:00 ~ 17:00

FraMCoS-7 Technical Program

May 23 ~ 28, 2010 at Seogwipo KAL Hotel, Jeju, Korea

► May 23 (Sunday), 2010

15:30 – 20:00 **REGISTRATION**

First Floor Foyer

► May 24 (Monday), 2010

08:30 – 18:00 **REGISTRATION**

First Floor Foyer

09:00 – 09:20 **OPENING CEREMONY**

Diamond Room (B1)

09:20 – 10:50 **PLENARY SESSION**

Diamond Room (B1)

(Chairman: B. H. Oh)

1. **Statistical aspects of quasibrittle size effect and lifetime, with consequences for safety and durability of large structures** (Z. P. Bazant)
2. **Surface energy and fracture energy** (F. H. Wittmann)

10:50-11:20 **Coffee Break**

11:20-12:50 **PARALLEL SESSIONS**

11:20-12:50 **Session 1A: Fracture Energy and Toughness 1**

Diamond (B1)

(Chairmen: A. R. Ingraffea and P. Stroeven)

1. **Misconceptions on variability of fracture energy, its uniaxial definition by work of fracture, and its presumed dependence on crack length and specimen size** (Z. P. Bažant, Qiang Yu, Gianluca Cusatis, Luigi Cedolin and Milan Jirásek)
2. **The toughness of imperial roman concrete** (P. Brune, R. Perucchio, A.R. Ingraffea and M.D. Jackson)
3. **Fracture process zone development and energy dissipation during fracture in concrete wedge-splitting specimens** (V. Veselý, P. Frantík and S. Seitl)
4. **Relationship between G_F and G_f** (H. Eskandari Naddaf, S. Muralidhara, B.K. Raghu Prasad and B V Venkatarama Reddy)
5. **The effect of gamma radiation on the fracture properties of concrete** (Y. Kitsutaka and K. Matsuzawa)

11:20-12:50 **Session 1B: Softening and Micromechanics**

Crystal (F1)

(Chairmen: W. Gerstle and H. Stang)

1. **A fundamental explanation of softening** (Jan G. M. van Mier)
2. **Comparison of peridynamic and continuum mechanics models for concrete** (W. Gerstle, N. Sakhavand and S. Chapman)
3. **3D simulation of micromechanical behavior of cement paste** (Z. Qian, G. Ye, E. Schlangen and K. van Breugel)

4. **Micromechanical estimation of hydro-mechanical parameters in unsaturated microcracked concrete** (A. Tognevi, B. Bary, and A. Delaplace)
5. **Investigation on time-dependent fracture mechanism of mortar based on meso-scale numerical approach** (K. Matsumoto, Y. Sato and T. Ueda)

11:20-12:50 **Session 1C: (Organized Session) Dynamic Fracture** Emerald (B2)
(Chairmen: G. Ruiz and X. X. Zhang)

1. **The dynamic fracture energy of concrete** (J. Weerheijm and I. Vegt)
2. **The response of concrete structure under dynamic loadings: tools for seismic effects and impacts** (J. Mazars, A. Rouquand and C. Pontiroli)
3. **Impact response of post-tensioned and reinforced concrete members with an UHPFRC overlay** (K. Habel)
4. **Fracture behaviour of high-strength concrete at different loading rates** (G. Ruiz, X. X. Zhang, E. Poveda, R. Porras and J. R. Viso)
5. **Crack velocities in high-strength concrete at a wide range of loading rates** (X. X. Zhang, R. C. Yu, G. Ruiz, M. Tarifa and M. Camara)

11:20-12:50 **Session 1D: (Organized Session) Discrete Modeling 1** Sapphire (B2)
(Chairmen: J. Bolander and G. Cusatis)

1. **Discrete Element Model of Concrete under high confining pressure** (V.T. Tran, F.V. Donzé and P. Marin)
2. **On a three-dimensional lattice approach for modeling corrosion induced cracking and its influence on bond between reinforcement and concrete** (P. Grassl and T. Davies)
3. **Analyses of pre- and post-peak behavior of deep beams failed in shear using 3D-RBSM** (Y.H. Gedik, H. Nakamura, M. Kunieda and Y. Yamamoto)
4. **Fracture analysis of strain hardening cementitious composites by means of discrete modeling of short fibers** (M. Kunieda, K. Kozawa, N. Ueda and H. Nakamura)
5. **The lattice discrete particle model (LDPM) for the simulation of uniaxial and multiaxial behavior of concrete: recent results** (G. Cusatis, A. Mencarelli, D.e Pelessone and J.T. Baylot)

11:20-12:50 **Session 1E: Behavior of Anchors and Studs** Rose (B1)
(Chairmen: R. Eligehausen and T. Tsubaki)

1. **Behavior of anchor groups installed in cracked concrete under simulated seismic actions** (P. Mahrenholtz and R. Eligehausen)
2. **Multi-layer model for pull-out behavior of post-installed anchor** (M. Saleem and T. Tsubaki)
3. **Push-out tests on shear studs in high strength concrete** (H. B. Shim, K. S. Chung, S. H. Jang, S. J. Park and J. H. Lee)
4. **3D FE analysis of fasteners at elevated temperatures** (G. Periškić, J. Ožbolt and R. Eligehausen)
5. **Experimental and analytical study on anchorage capacity between single-pole tower and RC foundation** (S. Saito, T. Kamimoto and K. Yui)

12:50-14:00 **Lunch 1 (Monday)**

14:00-15:48 **PARALLEL SESSIONS**

14:00-15:48 **Session 2A: Modeling Cracks and Fracture 1** Diamond (B1)

(Chairmen: P. Rossi and M. Shigeishi)

1. **A mixed mode model for fracture in concrete** (L. O. Nielsen, J. F. Mougard, J. S. Jacobsen and P. N. Poulsen)
2. **Macroscopic probabilistic modeling of concrete cracking. First 3D results** (J.-L. Tailhan, P. Rossi and S. Dal Pont)
3. **Modeling of multiple cracks in plain and reinforced concrete beams** (K. M. Pervaiz Fathima and J. M. Chandra Kishen)
an equivalent single crack or as an equivalent damage zone with reduced stiffness.
4. **Energy based fatigue crack propagation model for plain concrete** (Sonalisa Ray and J. M. Chandra Kishen)
5. **Crack interaction and localization in tunnel linings** (M. Nakano and Z. Shi)
6. **Particle discretization techniques for fracture simulation of concrete materials** (D. Asahina and J. E. Bolander)

14:00-15:48 **Session 2B: FEM & Discrete Element Analysis 1** Crystal (F1)

(Chairmen: A. Delaplace and M. Vorechovsky)

1. **Combining finite/discrete element models: a post-processing tool for fine cracks in concrete structures** (B. Richard, L. Adelaide, A. Delaplace, F. Ragueneau and C. Cremona)
2. **3D FE analysis of anchor channels and headed anchors under shear load close to the edge** (P. Grosser, R. Eligehausen and J. Ožbolt)
3. **Integration of contact elements in RGIB-module of the Finite Element software “CESAR-LCPC”: Application to concrete structures affected by internal swelling reactions** (O. Omikrine-Metalssi, V.-D. Le, J.-F. Seignol, S. Rigobert, P. Humbert and F. Toutlemonde)
4. **FEM simulation of a highly accurate impact echo method of PC grout simulation using a time domain signal** (T. Iwamoto, K. Mori and I. Torigoe)
5. **Discrete modeling of structural elements** (A. Delaplace, A. Tognevi and B. Bary)

14:00-15:48 **Session 2C: Size and Scale Effects** Emerald (B2)

(Chairmen: G. Pijaudier-Cabot and M. Corrado)

1. **Cohesive-overlapping crack model describing the size-scale effects on the rotational capacity of RC beams in bending** (M. Corrado, M. Paggi and A. Carpinteri)
2. **Application of digital image correlation to size effect tests of concrete** (S. Yasir Alam and A. Loukili)
3. **Role of diagonal tension crack in size effect of shear strength of deep beams** (Y. Tanaka, T. Shimomura and M. Watanabe)
4. **Size-scale effects on minimum flexural reinforcement in RC beams: Application of the Cohesive Crack Model** (E. Cadamuro, M. Corrado and A.

Carpinteri)

5. **Scaling of fracture properties of fibre reinforced cement** (C. Rieger and J.G.M. van Mier)
6. **Size effect on toughness property of strain hardening cementitious composite** (S.L. Xu, L.J. Hou and X.F. Zhang)

14:00-15:48 **Session 2D: Creep and Shrinkage**

Sapphire (B2)

(Chairmen: V. Slowik and G. Appa Rao)

1. **Capillary shrinkage cracking – Experiments and numerical simulation** (V. Slowik, M. Schmidt and B. Villmann)
2. **Influence of temperature and composition upon drying of concretes** (F. Brue, Y. Liang, N. Burlion, F. Skoczylas, X. Bourbon and G. Camps)
3. **Creep and effective stiffness of early-age concrete slabs** (H. G. Park, H. J. Hwang, J. Y. Kim, G. H. Hong, J. H. Im, and Y. N. Kim)
4. **Prediction of Time Dependent Effects in Prestressed Concrete** (I. Yamini Sreevalli and G. Appa Rao)
5. **Prediction equation of drying shrinkage of concrete** (K. Teranishi)
6. **Effect of heat curing at early age on drying shrinkage and microstructure of hardened cement pastes** (Z.J. Kang, C.J. Wan, Q.Y. Yin, L.J. Liu, W. Zhang and Y.S. Wang)

14:00-15:48 **Session 2E: Permeability and Resistivity**

Rose (B1)

(Chairmen: V. Mechtcherine and T. Matsumoto)

1. **Real time monitoring of concrete resistivity in cracking concrete** (C. Boulay, S. Dal Pont and J.L. Tailhan)
2. **Experimental analysis and numerical simulation of permeability evolution in cracking concrete** (H. Yang, Y. Liang, Y. Jia and J. F. Shao)
3. **Gas permeability of macro-cracked concrete: effect of temperature and water saturation** (Wei Chen and Frédéric Skoczylas)
4. **Comparison of chloride diffusion in nine months concrete specimens containing metakaoline and silica fume pozzolans.** (F. Pargar, M. Valipour and M. Shekarchi)
5. **Chloride penetration resistance properties of concrete containing mineral admixtures** (Jaekang Yoo, Bohwan Oh, Sangjoon Park and Seongwoon Kim)
6. **Comparative study of nano-SiO₂ and silica fume on gas permeability of high performance concrete(HPC)** (M. Valipour, A. Mirdamadi and M. Shekarchi)

15:48 – 16:18 **Coffee Break**

16:18 – 18:06 **PARALLEL SESSIONS**

16:18 – 18:06 **Session 3A: Modeling Cracks and Fracture 2**

Diamond (B1)

(Chairmen: E. Schlangen and S. Valente),

1. **A generalized discrete strong discontinuity approach** (D. Dias-da-Costa, J. Alfaiate, L.J. Sluys and E. Júlio)
2. **Analysis of the dam-foundation joint through the cohesive frictional crack**

- model** (F. Barpi and S. Valente)
3. **Combined approach based on the mechanical behavior and microstructural examinations for the fracture of concrete** (H. Yildirim, O.N. Oktar, Y. Akkaya, O. Sengul and M.A. Tasdemir)
 4. **Recent advances on self healing of concrete** (E. Schlangen, H. Jonkers, S. Qian and A. Garcia)
 5. **Experimental and numerical study towards a deformation-based seismic assessment of substandard exterior R.C. beam-column joints** (G. Genesio, R. Eligehausen, A. Sharma and S. Pampanin)
- 16:18 – 18:06 **Session 3B: FEM & Discrete Elem. Analysis 2** Crystal (F1)
(Chairmen: C. K. Y. Leung and P. N. Poulsen)
1. **Stress-compatible embedded cohesive crack in CST element** (J. F. Olesen and P. N. Poulsen)
 2. **Finite element study on bond behavior of steel bar and HSCC/HSFRCC** (A. K. F. Cheung, C. K. Y. Leung and P. Kabele)
 3. **Mesh dependency and related aspects of lattice models** (M. Vořechovský and J. Eliáš)
 4. **A simplified XFEM approach for local enrichment** (P. N. Poulsen and J. F. Olesen)
 5. **Modelling concrete structures applying XFEM with a mixed mode constitutive model** (J. F. Mougard, P. N. Poulsen and L. O. Nielsen)
- 16:18 – 18:06 **Session 3C: Fiber Reinforced Concrete 1** Emerald (B2)
(Chairmen: A.E. Naaman and T.H.-K. Kang)
1. **Correlation between tensile and bending behavior of FRC Composites with scale effect** (D.J. Kim, A.E. Naaman and S. El-Tawil)
 2. **Shear strength of steel fiber-reinforced lightweight concrete beams** (T.H.-K. Kang and W. Kim)
 3. **Fracture simulation of fiber reinforced concrete by Visco-Elasto-Plastic suspension element method** (HIRAIWA Takashi and TANIGAWA Yasuo)
 4. **Simulation of tensile performance of fiber reinforced cementitious composite with fracture mechanics model** (J. Zhang, C. K.Y. Leung and Y. Gao)
 5. **Shear resistance of ultra high performance fibre-reinforced concrete I-beams** (F. Baby, J. Billo, J.-C. Renaud, C. Massotte, P. Marchand, F. Toutlemonde, A. Simon and P. Lussou)
 6. **Methodology of modeling fiber reinforcement in concrete elements** (P. Stroeven)
- 16:18 – 18:06 **Session 3D: Bond and Bond-Slip Behavior** Sapphire (B2)
(Chairmen: K. Rokugo and S. L. Xu)
1. **A local bond stress-slip model for reinforcing bars in self-compacting concrete** (P. Desnerck, G. De Schutter & L. Taerwe)
 2. **Numerical investigation on bond behavior of corroded reinforcement** (C. Fischer, J. Özbolt and C. Gehlen)
 3. **Rebar bond slip in diagonal tension failure of reinforced concrete beams**

(T. Hasegawa)

4. **Bond behavior of corroded reinforcing bar and ultra high toughness cementitious composites (UHTCC)** (S. L. Xu and X. H. Cai)
5. **An experimental study on the effects of cracks on corrosion distribution and bond behavior of reinforcing bar** (K. Kobayashi, K. Rokugo, K. Sugiki, T. Inaguma and S. Maruyama)

16:18 – 18:06 **Session 3E: ASR and Durability**

Rose (B1)

(Chairmen: S. Yoshida and S. Hanehara)

1. **Modeling of expansion and cracking due to ASR with a 3D lattice model** (E. Schlangen and O. Copuroglu)
2. **Reproduction of delayed ettringite formation (DEF) in concrete and relationship between DEF and alkali silica reaction** (S. Hanehara and T. Oyamada)
3. **Applicability of concrete using different admixtures to PC structures and their effects on improving durability** (S. Yoshida, T. Nawa, F. Taguchi, H. Watanabe)
4. **Study of the effect of alkali-silica reaction on properties of concrete by means of conventional test methods and non-destructive test methods** (M.Hosein Eftekhari, Saman R.Moghadam, Mohammad Shekarchi and A.mirdamadi)
5. **Prediction model for the weathering of sandstone based on fracture processes** (E. Kotan and H.S. Müller)
6. **Numerical study in the influence of carbonation on the penetration of chloride into concrete** (C. Y. Kim and J. K. Kim)

18:30 – 21:00 **WELCOME RECEPTION**

► May 25 (Tuesday), 2010

08:30 – 18:00 **REGISTRATION**

First Floor Foyer

09:00 – 10:30 **PLENARY SESSION**

Diamond (B1)

(Chairman: J. van Mier)

1. **Exploration of fracture characteristics, nanoscale properties and nanostructure of cementitious matrices with carbon nanotubes and carbon nanofibers** (S. P. Shah)
2. **Energy emissions from fracture of concrete : Acoustic, electromagnetic, piezonuclear** (A. Carpinteri)

10:30 – 11:00 **Coffee Break**

11:00 – 12:48 **PARALLEL SESSIONS**

11:00 – 12:48 **Session 4A: Fracture Energy & Cracking**

Diamond (B1)

(Chairmen: T. Bittencourt and V. T. N. Dao)

1. **Fracture energy of high performance mortar subjected to high temperature** (S. Djaknoun, E. Ouedraogo and A. Ahmed Benyahia)
2. **Acoustic and electromagnetic emissions related to stress-induced cracks** (G. Lacidogna, A. Manuello, A. Carpinteri, G. Durin, G. Niccolini, A. Schiavi and A. Agosto)
3. **Fracture mechanics of early-age concrete** (V.T.N. Dao, P.H. Morris and P.F. Dux)
4. **3D tomographic imaging applied to split cylinder fracture** (E. Landis, M. Bridges and J. Bolander)
5. **Cracking of walls of brittle granular materials under prestress** (T. Tsubaki, D. Zangmo and M. Saleem)
6. **b-value of plain concrete beams based on AE Quanta** (S. Muralidhara, Hamid Eskandari, B. K. Raghu Prasad and R. K. Singh)

11:00 – 12:48 **Session 4B: (Organized Session) From Damage to Fracture**

(Chairmen: J. Mazars and C. La Borderie)

Crystal (F1)

1. **Nonlocal boundary layer (NBL) model: overcoming boundary condition problems in strength statistics and fracture analysis of quasibrittle materials** (Zdeněk. P. Bažant, Jia-Liang Le and Christian G. Hoover)
2. **A mesoscopic approach for a better understanding of the transition from diffuse damage to localized damage** (C. La Borderie, C. Lawrence, T. D. N'Guyen and G. Nahas)
3. **Benchmark on the cracking simulation of reinforced concrete ties** (L. Jason, C. La Borderie, C. Giry, B. Richard, M. Chambart and G. Thillard)
4. **Analysis of X-ray tomographic images of concrete after severe triaxial loading** (C. Poinard, Y. Malécot, L. Daudeville and E. Landis)
5. **Nonlocal damage-based failure models, extraction of crack opening and transition to fracture** (F. Dufour, G. Pijaudier-Cabot and G. Legrain)
6. **Boundary effects in nonlocal damage model** (G. Pijaudier-Cabot, F. Dufour and A. Krayani)

- 11:00 – 12:48 **Session 4C: Fiber Reinforced Concrete 2** Emerald (B2)
 (Chairmen: G. A. Plizzari and K. Watanabe)
1. **Fibre-matrix interface properties in a wood fibre reinforced cement matrix** (M. G. Sierra Beltran and E. Schlangen)
 2. **Fuzzy logic model of fiber concrete** (A. Kohoutková, P. Štemberk and N. Pokorná)
 3. **Modeling of UHPFRC I-beam with linear complementarity problem** (Y. H. Guo and S.M. Han)
 4. **Evaluation of shear carried by steel fibers in reinforced concrete beams with steel fibers** (K. Watanabe, P. Jongvivatsakul, J. Niwa and T. Kimura)
 5. **Fiber reinforced concrete characterization through round panel test - Part I: experimental study** (F. Minelli and G.A. Plizzari)
 6. **Fiber reinforced concrete characterization through round panel test - Part II: analytical and numerical study** (F. Minelli and G.A. Plizzari)
- 11:00 – 12:48 **Session 4D: (Organized Session) Discrete Modeling 2** Sapphire (B2)
 (Chairmen: J. E. Bolander and G. Cusatis)
1. **Discrete modeling of plastic cement paste subjected to drying** (V. Slowik and J. W. Ju)
 2. **Analysis of damage distribution in concrete specimens of varying sizes** (Hau-Kit Man and Jan G.M. van Mier)
 3. **Discontinuous cell method (DCM) for cohesive fracture propagation** (G. Cusatis and E. Schaufert)
 4. **Modeling of phase interfaces during precritical crack growth in concrete** (J. E. Bolander and E. Landis)
 5. **Static and fatigue failure simulation of concrete material by discrete analysis** (K. Nagai and K. Matsumoto)
 6. **Simulation of Concrete Fracture under Different Loading Rates Using Rigid-Body-Spring Networks** (Kunhwi Kim, Yun Mook Lim, Sunyoung Choi and John E. Bolander)
- 11:00 – 12:48 **Session 4E: (Organized Session) Corrosion-Induced Cracking 1** Rose (B1)
 (Chairmen: C. Andrade and H. Yokota)
1. **Relation between crack width and corrosion degree in corroding elements exposed to the natural atmosphere** (C. Andrade, A. Muñoz and A. Torres-Acosta)
 2. **Open-slip coupled model for simulating three dimensional bond behavior of reinforcing bar in concrete after corrosion** (F. Shang, X. An, T. Mishima and K. Maekawa)
 3. **Safety assessment and strengthening method for the structural concrete with corrosion induced cracking around anchorage zones** (N. Chijiwa and K. Maekawa)
 4. **Simplified assessment on structural performance of deteriorated concrete members** (H. Yokota, E. Kato and M. Iwanami)
 5. **Chloride diffusion in the cracked concrete** (Chloride Diffusion in the Cracked Concrete)

6. **Cracking of concrete cover in reinforced concrete under various corrosion distributions** (B. S. Jang, S. Y. Jang, B. H. Oh, S. Shin, S. W. Yoo and M. K. Lee)

12:48 – 14:00 **Lunch II (Tuesday)**

14:00 – 15:48 **PARALLEL SESSIONS**

14:00 – 15:48 **Session 5A: Cracking, Crack Extension** Diamond (B1)
(Chairmen: J. H. Nielsen and M. Butler)

1. **Crack-bridging behaviour of AR-glass multifilament yarns embedded in cement-based matrix – Modelling of ageing effects** (M. Butler and V. Mechtcherine)
2. **The influence of reinforcing bar on crack extension of concrete** (Y. Zhu and S. L. Xu)
3. **Effect of fusion bonded epoxy coating and rib geometry on cracking of reinforced concrete** (K. Pandurangan and G. Appa Rao)
4. **Cohesive-force-based GR crack extension resistance of concrete** (X. F. Zhang and S. L. Xu)
5. **Snap-through cracking in plastic concrete slabs** (P. H. Morris, P. F. Dux and V. T. N. Dao)
6. **Post-crack capacity of mechanically reinforced glass beams (MRGB)** (J. H. Nielsen and J. F. Olesen)

14:00 – 15:48 **Session 5B: (Organized Session) Fracture Process Monitoring 1** Crystal (F1)
(Chairmen: M. Ohtsu and T. Kamada)

1. **Monitoring corrosion-induced cracks in concrete by acoustic** (Yuich TOMODA, Kanako MORI, Yuma KAWASAKI and Masayasu)
2. **Visualization of internal defects in concrete structures by SIBIE** (K. MATSUYAMA, M. YAMADA and M. OHTSU)
3. **Evaluation of ungrouted tendon ducts in prestressed concrete structure by SIBIE** (M. Yamada, T. Okubo and M. Ohtsu)
4. **Quality evaluation of concrete aggregate by weibull-distribution analysis of AE** (S. Iizasa and M. Shigeishi)
5. **Acoustic emission visualization of micro-cracks induced by pulsed discharge in concrete** (N. N. Kencanawati, M. Shigeishi, T. Namihira, M. Ohtsu and K. Ohno)
6. **Detecting horizontal cracks in RC slabs with asphalt overlays using** (T. Kamada, S. Uchida and K. Nakayama)

14:00 – 15:48 **Session 5C: Fiber Reinforced Concrete 3** Emerald (B2)
(Chairmen: S. J. Foster and F. J. Vecchio)

1. **Unified model for mixed mode fracture of steel fibre reinforced concrete** (T. N. S. Htut and S. J. Foster)
2. **Effectiveness of Steel Fibers as a Crack Controller: Assessment using Shear Panel Tests** (J. Susetyo, P. Gauvreau and F. J. Vecchio)
3. **Physical and mechanical properties of ultra high strength fiber**

reinforced cementitious composites (C. Magureanu, I. Sosa, C. Negrutiu and B. Heghes)

4. **Ultra high strength fiber reinforced concrete using aramid fiber** (Y. Uchida, T. Takeyama and T. Dei)
5. **Properties of ultrarapid-hardening polymer- modified concrete with fiber content** (B. C. Lho, M. G. Joo, J. Y. Choi and K. H. Choi)

14:00 – 15:48 **Session 5D: Monitoring, Maintenance, Splices** Sapphire (B2)

(Chairmen: Zongjin Li and S. Invernizzi)

1. **Crack detection using embedded cement-based piezoelectric sensor** (Youyuan Lu and Zongjin Li)
2. **AE monitoring of a two-span model masonry arch bridge subjected to pier scour** (S. Invernizzi, G. Lacidogna, A. Manuello and A. Carpinteri)
3. **Experimental investigation of compressive concrete elements confined with shape memory Ni-Ti wires** (Zanyar Mirzaee, Masoud Motavalli and Mohamad Shekarchi)
4. **Reliability based maintenance planning of RC bridges considering spatial variability of corrosion-induced crack width** (A. Rahai and A. Firouzi)
5. **Compression splice length in confined concrete** (S.-C. Chun, S.-H. Lee, and B. Oh)
6. **Damage-fracture coupling analysis of mode I crack in the concrete under high rate of loading** (H. L. Wang, W. L. Jin, X.Y. Sun and Q. B. Li)

14:00 – 15:48 **Session 5E: (Organized Session) Corrosion-Induced Cracking 2**

(Chairmen: B. H. Oh and C. P. Ostertag)

Rose (B1)

1. **Effect of crack control in hybrid fiber reinforced concrete composites on corrosion rate of steel reinforcing bars** (C. P. Ostertag and J. Blunt)
2. **Cover cracking in RC columns subjected to reinforcement corrosion under sustained load** (S. Jabbour and B. Martín-Pérez)
3. **Study on the influencing factors of steel corrosion in cracked concrete** (W. Tian, A. Volkwein and P. Schießl)
4. **Cracking corrosion ratio with respect to cracking of concrete cover** (B. S. Jang, K. H. Kim, B. H. Oh, J. S. Kim, S. L. Lee and H. J. Lee)
5. **Crack propagation analysis due to rebar corrosion** (H. Nakamura, K. K. Tran, K. Kawamura and M. Kunieda)
6. **Modeling of reinforcement corrosion in concrete** (D. Vořechovská and M. Vořechovský)

15:48 – 16:18 **Coffee Break**

16:18 – 18:06 **PARALLEL SESSIONS**

16:18 – 18:06 **Session 6A: Cracking, Crack Width**

Diamond (B1)

(Chairmen: H. G. Park and P. Grassl)

1. **Measuring crack width and spacing in reinforced concrete members** (S. Yasir Alam, T. Lenormand, A. Loukili and J. P. Regoin)

2. **Crack risk analysis in structural elements exposed to hygrothermal phenomena** (A. Meda, G. Plizzari, C. Zanotti and S. Cangiano)
3. **Early-age cracking in massive concrete structures: an active ring test to study the effects of reinforcement and construction joints** (M. Briffaut, F. Benboudjema, G. Nahas and J. M. Torrenti)
4. **Theoretical development of CP method in predicting expansive cement concrete cracking** (Y. Ishikawa and T. Tanabe)
5. **A study on the cracks dispersible technique for R/C member** (T. Tamura and Y. Kitazono)
6. **Effects of shore stiffness and concrete cracking on slab construction load** (H.G. Park, H.J. Hwang, J.Y. Kim, G.H. Hong, J.H. Im and Y.N. Kim)

16:18 – 18:06 **Session 6B: (Organized Session) Fracture Process Monitoring 2**

(Chairmen: M. Ohtsu and T. Kamada) Crystal (F1)

1. **Depth of through-thickness crack in concrete estimated by impact-echo** (M. Tokai, T. Kurokawa and M. Ohtsu)
2. **Detection of cracks in concrete and evaluation of freeze-thaw resistance using contrast X-ray** (M. Takeda and K. Otsuka)
3. **Stiffness estimation of RC bridges based on vehicle responses** (Y. Oshima, K. Yamamoto and K. Sugiura)
4. **Damage identification of cracked concrete by X-Ray computed tomography method** (T. Suzuki, M. Aoki and M. Ohtsu)
5. **Quantified estimation of rebar corrosion by means of acoustic emission technique** (T. Shiotani, M. Kunieda and N. Okude)
6. **Development of high -accurate impact echo method and its application to filling evaluation of PC grout** (K. Mori, I. Torigoe and T. Iwamoto)

16:18 – 18:06 **Session 6C: Fiber Reinforced Concrete 4** Emerald (B2)

(Chairmen: M. A. Tasdemir and B. K. Raghu Prasad)

1. **Effect of short fibres on fracture behaviour of textile reinforced concrete** (Rabea Barhum and Viktor Mechtcherine)
2. **Mode I and II fracture behaviour of steel fibre reinforced high strength geopolymer concrete: an experimental investigation** (T. S. Ng, T. N. S. Htut and S. J. Foster)
3. **Long-term behaviour of cracked SFRC beams exposed to aggressive environment** (N. Buratti, C. Mazzotti and M. Savoia)
4. **Optimum design of normal and high strength SFRCs: Limit states and performance classes** (M. Yalcin, C. Tasdemir, M. A. Tasdemir, I. Gokalp and M. Yerlikaya)
5. **Fracture properties of high-strength steel fiber concrete** (Wha-Jung Kim, Min-Seok Kwak and Jun-Cheol Lee)

16:18 – 18:06 **Session 6D: Behavior of SHCC (HPFRCC)** Sapphire (B2)

(Chairmen: L. Ferrara and M. Kunieda)

1. **Identification of the stress-crack opening behavior of HPFRCC: the role of flow-induced fiber orientation** (L. Ferrara, M. di Prisco and M. G. L. Lamperti)

2. **Engineered cementitious composites with low volume of cementitious materials** (Jian Zhou, Shunzhi Qian, Guang Ye and Klaas van Breugel)
3. **Fracture Behavior of steel reinforced UHP-SHCC under Axial Tension** (M. Kunieda, M. Hussein, N. Ueda and H. Nakamura)
4. **Fracture energy of UHP-FRC under direct tensile loading** (K. Wille and A. E. Naaman)
5. **Flexural performance of extruded ECC panel** (Y. Y. Kim, B. Y. Lee, B. C. Han and C. G. Cho)
6. **Double-edge wedge splitting test: preliminary results** (M. di Prisco, M. G. L. Lamperti and S. Lapolla)

16:18 – 18:06 **Session 6E: Corrosion and Cracking**

Rose (B1)

(Chairmen: Flore Brue and K. Otsuka)

1. **Investigations on the mechanism of concrete cover cracking due to reinforcement corrosion** (E. Böhner, H. S. Müller and S. Bröhl)
2. **Modeling Formation of Cracks in Concrete Cover due to Reinforcement Corrosion** (A. Michel, M. R. Geiker, H. Stang, J. F. Olesen and A. O. S. Solgaard)
3. **Numerical modeling of cracking of concrete due to corrosion of reinforcement – Impact of cover thickness and concrete toughness** (A. O. S. Solgaard, A. Michel, H. Stang, M. R. Geiker, C. Edvardsen and A. Küter)
4. **Degradation of reinforced concrete structures under atmospheric corrosion** (A. Millard, V. Leyre and V. L'Hostis)
5. **A model for predicting time to corrosion-induced cover cracking in reinforced concrete structures** (C.H. Lu, R.G. Liu and W.L. Jin)

► May 26 (Wednesday), 2010

08:30 – 18:00 REGISTRATION

First Floor Foyer

09:00 – 10:30 PARALLEL SESSIONS

09:00 – 10:30 **Session 7A: Fracture Energy & Strength**

Diamond (B1)

(Chairmen: H. Reinhardt and M. Reda Taha)

1. **Fracture toughness of hydrated cement paste using nanoindentation** (M. Reda Taha, E. Soliman, M. Sheyka, A. Reinhardt and M. Al-Haik)
2. **Toughness indices of fiber reinforced concrete subjected to mode II loading** (G. Appa Rao and A. S Rao)
3. **Experimental determination of mode II fracture toughness K_{IIc} for joint-grouting material by using electric properties** (Q. H. Li, C. X. Yu and S. L. Xu)
4. **Determination of size-independent specific fracture energy and acoustic emission energy of concrete** (R. Vidya Sagar and B. K.Raghu Prasad)

09:00 – 10:30 **Session 7B: (Organized Session) Computational Modeling**

(Chairmen: R. C. Yu and G. Ruiz)

Crystal (F1)

1. **Modeling the static-dynamic fracture in reinforced concrete** (R. C. Yu, L. Saucedo and G. Ruiz)
2. **Loading rate effect on notched flexural HSC beams** (A. L. Rosa, R. C. Yu, G. Ruiz, J. L. A. O. Sousa and T. N. Bittencourt)
3. **Simulation models of concrete structures for multi-disaster mitigation** (X. Z. Lu, Y. Li, Z. W. Miao and S. C. Chen)
4. **A Comparative Study between Smearred and Embedded Crack Models for Finite Element Analysis of Reinforced Concrete Beams** (A. L. Gamino, J. L. A. O. Sousa, O. L. Manzoli and T. N. Bittencourt)

09:00 – 10:30 **Session 7C: LCM and Durability**

Emerald (B2)

(Chairmen: T. Rougelot and T. F. Mayer)

1. **Life cycle management of concrete structures with respect to reinforcement corrosion and concrete deterioration Part I: birth certificate** (T. F. Mayer, C. Sodeikat and A. Schiessl-Pecka)
2. **Life cycle management of concrete structures with respect to reinforcement corrosion and concrete deterioration Part II: monitoring** (Ch. Sodeikat, A. Schiessl-Pecka, T. F. Mayer and A. Schossmann)
3. **Influence of chemical degradation on the mechanical behaviour-permeability coupling of an oil well cement paste under temperature** (I. Yurtdas, S. Xie, J. Secq, N. Burlion, J. F. Shao and F. Rodot)
4. **A study on re-deterioration of surface-coated sluice structures due to frost damage** (I. Naitoh and F. Taguchi)
5. **Cementitious composites during leaching and drying: X-ray microtomography analysis of cracking pattern dependence on size of rigid inclusions** (C. Peng, T. Rougelot, N. Burlion and D. Bernard)

- 09:00 – 10:30 **Session 7D: (Organized Session) Shrinkage-Induced Cracking**
(Chairmen: F. H. Wittmann and H. Mihashi) Sapphire (B2)
1. **Durability of SHCC under imposed strain** (F. H. Wittmann, P. Zhang, T. Zhao and L. Tian)
 2. **Fundamental properties of shrinkage cracking of high performance fiber reinforced cement-based composites** (K. Kirikoshi and H. Mihashi)
 3. **Experimental investigation for ECC improving shrinkage crack resistance and workability** (T. Kanda, S. Nagai and M. Maruta)
 4. **Constitutive relationships for Strain-Hardening Cement-based Composites (SHCC) subjected to tensile loading** (P. Jun and V. Mechtcherine)

- 09:00 – 10:30 **Session 7E: Strength, Damage, Fracture Tests** Rose (B1)
(Chairmen: Y. Y. Kim and D. Zheng)
1. **On the application of the Double-Edge Wedge Splitting Test to thermally-damaged concretes** (P. Bamonte and M. Lamperti)
 2. **Coupled damage and creep behavior of concrete under sustained loading** (D. Zheng and W. W. Li)
 3. **Investigation of Porous Concrete through Macro and Meso-Scale Testing** (A. S. Agar Ozbek, J. Weerheijm and E. Schlangen)
 4. **Comparison of stiff tension fracture test and notched beam level II fracture tests** (Walter Gerstle, Lary R. Lenke, Mahmoud Reda Taha, Joseph M. Magallanes, Ruben Martinez, Jacob S. Hays and Anthony S. Cabrera)
 5. **Experimental study on the double-k fracture parameters and brittleness of concrete with different Strengths** (B. Wang, J.G. Dai, X. F. Zhang and S. L. Xu)

10:30 – 11:00 **Coffee Break**

11:00 – 12:48 **PARALLEL SESSIONS**

- 11:00 – 12:48 **Session 8A: Interface Behavior & Bond** Diamond (B1)
(Chairmen: H-C. Shin and K. Yamada)
1. **Interfacial Shear Bond Strength between Old and New Concrete** (H-C. Shin and Z. Wan)
 2. **Relation of roughness parameters and tension softening diagram of concrete-to-concrete interface** (A. Satoh, K. Yamada, S. Ishiyama and T. Homma)
 3. **Determination of fracture parameters of concrete interfaces using DIC** (Santosh G. Shah and J. M. Chandra Kishen)
 4. **Bearing angle model for bond of reinforcing bars to concrete** (O. C. Choi, H. J. Choi and G. H. Hong)
 5. **Interfacial bond-slip behavior between CFRP plates and concrete** (Sung-Nam Hong, Jae-Joong Shim, Dong-Suk Yang, Taewan Kim and Sun-Kyu Park)

6. **Optimum treatment of PCM-concrete interfaces** (D. W. Zhang, H. Furuuchi, T. Ueda and F. Seiji)

11:00 – 12:48 **Session 8B: Constitutive Relations, Deep Beams** Crystal (F1)

(Chairmen: H. Akita and Yong-Hak Lee)

1. **Anisotropic loading criterion for depicting loading induced anisotropy in concrete** (Yong-Hak Lee, Yeong-Seong Park, Young-Tae Joo, Won-Jin Sung, and Byeong-Su Kang)
2. **A database for prediction of the tension softening curve of concrete made from crushed andesite** (H. Akita, H. Koide and H. Mihashi)
3. **An improved method to calculate the directions and weights in microplane constitutive model** (Wei Cheng and Zhenglai Shen)
4. **Effect of depth and distribution of horizontal shear reinforcement on shear strength and ductility of RC deep beams** (G. Appa Rao and B. S. R. K. Prasad)
5. **Prediction of size dependent strength of reinforced concrete deep beams using strut-and-tie model** (R. Sundaresan and G. Appa Rao)

11:00 – 12:48 **Session 8C: (Organized Session) Testing on SHCC** Emerald (B2)

(Chairmen: G. Fischer and T. Kanakubo)

1. **Relating tensile properties with flexural properties in SHCC** (S. Qian, V. C. Li and J. Zhou)
2. **Study on size effect in bending behavior of ECC** (Kohei Asano, Toshiyuki Kanakubo and Takashi Matsushima)
3. **Shear transmission on crack surface of ECC** (T. Kanakubo, K. Shimizu, S. Nagai and T. Kanda)
4. **Effects of fluidity and placing method of HPCRCC on tensile performance test results** (N. Morii, S-C. Lim, Y. Yamada and K. Rokugo)
5. **Crack formation and tensile stress-crack opening behavior of fiber reinforced cementitious composites (FRCC)** (E. B. Pereira, G. Fischer, J. A. O. Barros and M. Lepech)

11:00 – 12:48 **Session 8D: High Performance Concrete 1** Sapphire (B2)

(Chairmen: Ta-Peng Chang and G. Di Luzio)

1. **Numerical simulation of heat transfer and moisture transport in high performance concrete at early age** (G. Di Luzio, L. Cedolin and G. Cusatis)
2. **Statistical study on properties of high-performance recycled aggregate concrete** (Bo-Tsun Chen, Ta-Peng Chang, Tzong-Ruey Yang, Ya-Chu Chan and Tien-Chin Hsiao)
3. **Variations in cracking resistance of self-consolidating concrete at early age** (S. H. Kwon, K. Choi, S.D. Cho and H. Y. Park)
4. **Verification of wet and dry packing methods with experimental data** (M. Shekarchi, S. M. Mousavi, N. A. Libre and S. Soroush-Nia)
5. **Evaluation of experimental work on high strength concrete deep beam with various opening size and locations** (J. H. Doh, T. Yoo and H. Guan)

11:00 – 12:48 **Session 8E: Strength and Fracture Tests**

Rose (B1)

(Chairmen: T. Tanabe and Goangseup Zi)

1. **Evaluation of the splitting tension test for concrete from a fracture mechanical point of view** (V. Malárics and H. S. Müller)
2. **Measurement and characterization of mixed mode fracture in concrete** (J. S. Jacobsen, P. N. Poulsen and J. F. Olesen)
3. **Effect of fracture behavior and height-to-diameter ratio on high-strength concrete core specimens' compressive strength** (Shigeki SEKO, Sumie SUZUKI, Yasuji ITO and Tadatsugu KAGE)
4. **The characteristics of the biaxial flexure test for concrete** (Ji-Hwna Kim, Chau-Dinh Thanh, Goangseup Zi and Hongseub Oh)
5. **The flexural toughness of round plastic fiber reinforced shotcrete specimens with ring-supports** (Seung-Hwan Han, Sang-Don Lee, Jeong-Un Lee and In-Chang Jin)

12:48 – 14:00 **Lunch III (Wednesday)**

14:00 – 18:00 **OUTDOOR TECHNICAL VISIT**

► May 27 (Thursday), 2010

- 08:30 – 18:00 **REGISTRATION** First Floor Foyer
- 09:00 – 10:30 **PLENARY SESSION** Diamond Room (B1)
(Chairman: A. Carpinteri)
1. **Response of concrete members to impact loading** (H. W. Reinhardt)
 2. **Tension Tests and structural applications of strain hardening fiber reinforced cementitious composites** (K. Rokugo)
- 10:30 – 11:00 **Coffee Break**
- 11:00 – 12:48 **PARALLEL SESSIONS**
- 11:00 – 12:48 **Session 9A: Repair and Strengthening** Diamond (B1)
(Chairman: A. Martinez Boquera and F. Khestl)
1. **Reinforcement work carried out on the Todolella Parish Church after the collapse of a pilaster supporting the classical style dome; Castellon, Spain.** (A. Martinez Boquera, A. Alonso Durá, R. Soler Verdu and A. Soler)
 2. **Investigation on deformational behaviors in shear transfer section of reinforced concrete strengthened with CFRP sheets by X-ray technique using contrast medium** (Y. Koda, I. Iwaki, S. Nakamura, M. Suzuki, Y. Yaginuma and K. Otsuka)
 3. **Mistakes in diagnostics and rehabilitation of concrete structures** (F. Khestl and L. Židek)
 4. **Experimental study on the flexural behaviour of fibre reinforced concretes strengthened with steel and macro-synthetic fibres** (N. Buratti, C. Mazzotti and M. Savoia)
 5. **Behaviors of FRP sheet reinforced concrete to impact and static loading** (K. –H. Min, S. –H. Cho, D. –Y. Yoo and Y. –S. Yoon)
- 11:00 – 12:48 **Session 9B: Damage Estimation and Crack Control** Crystal (F1)
(Chairman: J. Zhang and L. Buffo-Lacarrière)
1. **Application of an anisotropic damage model to the prediction of early age cracking.** (L. Buffo-Lacarrière and A. Sellier)
 2. **Numerical modelling of concrete damage and fracture due to desiccation** (H. B. Bian, L. Chen and J. F. Shao)
 3. **Coupling creep and damage in concrete under high sustained loading** (J. Saliba, F. Grondin and A. Loukili)
 4. **Integration of neural networks with NDE for concrete strength prediction** (H. J. Kim, T. W. Park and L. Chung)
 5. **Crack width control of reinforced concrete one-way slabs utilizing expansive strain-hardening cement-based composites (SHCCs)** (H. D. Yun, S. W. Kim, Y. O. Lee, T. Izuka, Y. Sakaguchi, K. Rokugo and S. C. Lim)

11:00 – 12:48 **Session 9C: (Organized Session) Application of Advanced Fiber Reinforced Cement Materials**

(Chairman: K. Rokugo and Y. Tanaka)

Emerald (B2)

1. **Durability performance of UFC Sakata-Mira Footbridge under sea environment** (Y. Tanaka, H. Musha, S. Tanaka and M. Ishida)
2. **Recent innovative application of UFC bridges in Japan** (Y. Tanaka, A. Ohtake, H. Musha and N. Watanabe)
3. **Experimental investigation for ECC in applying to repairing water proofing structures** (T. Kanda, N. Sakata, M. Hiraishi, M. Fujishiro and M. Tokashiki)
4. **Measurement of movement in multi-layer sprayed lining using high performance fiber reinforced cement composite (HPFRCC) with multiple cracks** (Mamoru MORIYAMA, Naoyuki MORII, Minoru HORITA and Keitetsu)
5. **Landscaping of ASR-cracked retaining wall using HPFRCC shotcretes and observation over 5 years** (K. Rokugo, N. Morii, S-C. Lim, T. Kanda and N. Sakata)
6. **An analytical study on the stress-strain relation of PVA-ECC under tensile fatigue** (K. Kakuma, T. Matsumoto, T. Hayashikawa and X. He)

11:00 – 12:48 **Session 9D: High Performance Concrete 2**

Sapphire (B2)

(Chairmen: Y. S. Yoon and A. Anvari)

1. **The use of T-headed bars in high-strength concrete members** (J. M. Yang, K. H. Min, H. O. Shin and Y. S. Yoon)
2. **Development of high performance concrete and mock up test for mega foundation** (S. M. Woo, S. Y. Jun, J. H. Lee, S. H. Cho and J. Y. Bea)
3. **The quality properties of self consolidating concrete using lightweight aggregate** (Yong Jic Kim, Se Jin Jeon, Myoung Sung Choi, Young Jin Kim and Yun Wang Choi)
4. **Effects of Expanded Perlite Aggregate (EPA) on the mechanical behavior of Lightweight Concrete** (V. Khonsari, E. Eslami and A. Anvari)
5. **Investigation on characteristics of high fluidity concrete for tunnel lining** (O. Choi, G. B. Kim, W. Y. Choi, J. G. Jung and K. M. Lee)

11:00 – 12:48 **Session 9E: Impact, Dynamic, Blast Response**

Rose (B1)

(Chairman: Lan Chung and J. H. J. Kim)

1. **Blast loading response of ultra high performance concrete and reactive powder concrete slabs** (J. H. J. Kim, N. H. Yi, I. S. Oh, H. S. Lee, J. K. Choi and Y. G. Cho)
2. **An analytical study on the impact of hollow shapes in bi-axial hollow slabs** (J. H. Chung, J. H. Park, H. K. Choi, S. C. LEE and C. S. CHOI)
3. **Dynamic response of a seven-wire strand during two different detensioning procedures** (Seung-Jung Lee, Goangseup Zi, Do Young Moon, Jang-Ho Kim and Gyuseon Kim)
4. **Field falling impact test and numerical study for constituting impact resistant design of arch type RC structures** (A.Q.Bhatti, Aamir Mehmood, Abid Dastgir and Norimitsu Kishi)

5. **Slope constraint of accumulated number of switching for the control of semi-active control system** (JaeSang Shin, JinWook Joung and Lan Chung)

12:48 – 14:00 **Lunch IV (Thursday)**

14:00 – 15:30 **PARALLEL SESSIONS**

14:00 – 15:30 **Session 10A: Bonding & Debonding Phenomena** Diamond (B1)
(Chairmen: P. Cornetti and S. Park)

1. **An analytical model for FRP-concrete debonding based on an exponential softening law** (P. Cornetti and A. Carpinteri)
2. **Effect of hogging moment on FRP debonding from the substrate of concrete beams** (J. L. Pan, Trevor C. F. Chung and Christopher K. Y. Leung)
3. **Debonding condition monitoring of a CFRP laminated concrete beam using piezoelectric impedance sensor nodes** (S. Park, J.-W. Kim, H.-J. Chang and S.-K. Park)
4. **Strength of RC beams enhanced by CFS with variable bond conditions** (Soo-Yeon Seo, Hyun-Do Yoon, Ki-Bong Choi and Seung-Joe Yoon)
5. **Analysis of balanced double-lap joints with a bi-linear softening adhesive** (C. S. Hansen, H. Stang and J. W. Schmidt)

14:00 – 15:30 **Session 10B: RC and PSC Structures** Crystal (F1)
(Chairmen: K. C. G. Ong and T. Tamura)

1. **Current research activities in precast concrete structures in Singapore** (K. C. G. Ong, Z. Wang and K. Myint-Lay)
2. **Design concept of spliced holed web post-tensioned concrete girders** (M. Y. Han, Y-S. Jeon, S. Choi and H. K. Kim)
3. **Failure behavior characteristics of box culvert using 3-axes loading system** (S. K. Woo, J. H. Jo and Y. G. Kwon)
4. **Cracking analysis of brick masonry arch bridge** (J. M. Chandra Kishen and Ananth Ramaswamy)

14:00 – 15:30 **Session 10C: SHCC, Bond, Damping** Emerald (B2)
(Chairmen: O. C. Choi and H. Suwada)

1. **Behavior of concrete members constructed with SHCC/GFRP permanent formwork** (Changli Yu, Christopher K.Y. Leung and Qian Cao)
2. **Shear strength and deformation capacity of dampers with SHCC** (H. Suwada and H. Fukuyama)
3. **Bond analysis model of deformed bars to concrete** (O. C. Choi and S. Y. Yang)
4. **Performance enhancement effect of unreinforced masonry walls using sprayable ECC** (Baek-Il Bae, Byung-Kyu Park, Hyun-Ki Choi and Chang-Sik Choi)
5. **Monitoring hydration characteristics of cement paste by EMI method**

(R. Tawie, H.K. Lee, J. Min, and C.B. Yun)

- 14:00 – 15:30 **Session 10D: Cyclic & Ultimate Behavior** Sapphire (B2)
(Chairman: Y. Uchida and Wei Cheng)
1. **Pre and post-cracking behavior of steel-concrete composite deck subjected to high cycle load** (C. Fujiyama, K. Maekawa and E. Gebreyouhannes)
 2. **Experimental study on the ultimate strength of R/C curved beam** (T. Tamura and H. Murata)
 3. **Shear strength of interior slab-column connections** (K.-K. Choi and H.-G. Park)
 4. **Study on seismic behavior of concrete composite bearing wall** (CHEN Zhongfan, ZHANG Weijie and SHEN Xiaohui)
- 14:00 – 15:30 **Session 10E: Fire, Temperature, Fatigue** Rose (B1)
(Chairmen: J. Weerheijm and S. Seitl)
1. **Effect of polymer fibres inclusion in fire spalling of ultra-high performance concrete** (L. Missemer, E. Ouedraogo, Y. Malécot, D. Rogat and C. Clergue)
 2. **Effect of aggregates morphology on the THM behaviour of concrete at high temperatures** (T. T. H. Le, H. Boussa and F. Meftah)
 3. **Fire resistance of tunnel concrete depending on various heating curves and fire resistance methods** (C. G. Han, M. C. Han, J. S. Lee and C. Y. Lee)
 4. **The effect of high temperature on color and residual compressive strength of concrete** (Joongwon Lee, Kwangho Choi and Kappyo Hong)
 5. **Can microsilica improve concrete in terms of fatigue behavior** (S. Seitl, V. Bílek, Z. Keršner and L. Řoutil)
- 15:30 – 16:00 **Coffee Break**
- 16:00 – 17:00 **IA-FraMCoS GENERAL ASSEMBLY** Diamond (B1)
- 18:30 – 22:00 **BANQUET** Outdoor Terrace on the Sea Side

► May 28 (Friday), 2010

09:00-17:00 **Post-Conference Workshop on High Performance Concrete**

FraMCoS-7 Post-Conference Workshop on High Performance Concrete

Registration (08:30-09:00) Bohwan Oh _Moderator

Opening speech (09:00-09:10) Sungwoon Kim _Director of Concrete Corea

Morning Session

Chair _Hasun Jung and Kiyong Ann

09:10–10:10	Self-consolidating concrete : a material science approach S.P.Shah _Northwestern university
10:10–10:40	Field application of ultra high flow-able concrete (FlowCrete) Sangjoon Park _Daewoo E&C
10:40-11:00	Coffee break
11:00–11:30	Effects of mixing variables on the Properties of High-Fluidity Concrete Yeol Choi _Kyungpook university
11:30–12:00	Hygro-thermo-chemical-mechanical modeling of high performance concrete Giovanni Di Luzio _Politecnico di Milano

Afternoon session

Chair _Sangchul Kim

13:30–14:00	High performance fibre reinforced concrete: behavior and modeling Stephen Foster _New South Wales university
14:00–14:30	Representation of chloride threshold level for steel corrosion in concrete Kiyong Ann _Yonsei university
14:30–15:00	Fire resistance of the high performance concrete due to fiber addition Seakmin Hong _Cheongju university
15:00-15:30	Coffee break
15:30–16:00	Development and application of ultra high strength fiber reinforced concrete in Korea Sungwook Kim _Korea institute of construction technology
16:00–16:30	Effect of steel corrosion on the structural performance of concrete structure Haimoon Cheong _Korea expressway corporation

◆ Registration and Registration Fee

Conference registration fees include: admission to all scientific programs, conference portfolio, welcome reception, refreshments, lunches and the conference banquet.

All authors are required to register in advance. This is necessary for conference organizer to prepare the Author Kit for conference participation. In order to avoid “no shows” at the conference, at least a speaker among the authors is required to register before April 10, 2010.

Fees	Before Feb. 15, 2010	After Feb. 15, 2010
Registration Fee	US\$ 590	US\$ 690
For Students	US\$350	US\$ 400
Accompanying Persons Program	US\$ 120 (Reception, Banquet, Technical visit)	

The following three methods are possible for the payment of registration fee. The authors and conference participants are recommended to pay the registration fee primarily by the first method among the following three methods.

1. **On-line Credit Card Payment through Conference Website** (<http://www.framcos7.org>) → This method is convenient and recommended. Please visit the FraMCoS-7 website and just click on “Online Registration” for conference registration: <http://www.framcos7.org>
2. **Off-line Credit Card Payment by Fax**: The participants who want to pay registration fee by this Off-line credit card payment should download first the [Registration Form](#) and fill out the form with signature, and then send the signed completed form to the framcos-7 secretariat by fax. The fax number is: +82-2-364-4770. Or if you would like to send this form by email, first fill out the form with signature and then scan it. Then, send the scanned file by email. E-mail: secretariat@framcos7.org Just for your reference, the Off-line Credit Card Registration Form is attached here on the following page.
3. **Bank Transfer Payment**: The participants who want to pay registration fee by bank transfer should first send the registration fee through bank transfer in their countries and then send the signed completed [Registration Form](#) to the framcos-7 secretariat by fax. The fax number is: +82-2-364-4770. The [Registration Form](#) can be downloaded from the conference website. The bank information for FraMCoS-7 Conference is as follows.
Name of Bank: CITI BANK KOREA INC.
Swift Code; CITIKRSX
Account No.: **186-00166-245-01**
Name of Bank Holder: Korea Concrete Institute-FRAMCOS
Address of Bank: New Building, The Korea Science & Technology Center, 635-4, Yeoksam-dong, Kangnam-gu, Seoul, 135-703, Korea

Just for your reference, the Bank Transfer Registration Form is attached here on the following page.

For more detailed information on the payment of registration fee, just visit the conference website: <http://www.framcos7.org>

On-Site Registration

The On-Site Registration Desk will be open and located on the 1st floor of the conference hotel, Seogwipo KAL Hotel, during the FraMcoS-7 conference. Not only the participants can register on-site, but also the already-registered participants can pick up the author and participant kit.

FraMCoS-7 REGISTRATION FORM for Off-line Credit Card Payment

7th International Conference on
Fracture Mechanics of Concrete and Concrete Structures
Seogwipo KAL Hotel, Jeju, Korea, May 23~28, 2010

Please return the completed form with signature by Fax; **Fax No.: +82-2-364-4770**
Or if you would send this form by email, first fill out the form with signature and then scan it. Then, send the scanned file by email.
E-mail: secretariat@framcos7.org

Only one delegate per form (photocopies may be used). Please type or print in block lettering.

<input type="checkbox"/> Speaker <input type="checkbox"/> Non-speaker <i>Please mark an "X" in an appropriate box. Choose only one.</i>	Surname: Ms / Mr / Dr / Prof		First Name(s):			
	Title:		Institute/Company:			
	Mailing Address:			Email:		
	City/Postal code	Country	Phone (+)	Fax No.(+)		
If you are one of the authors:	Paper No.		Paper Title:			
Accompanying Person(s)	Surname Ms / Mr / Dr		First Name(s)			
Registration (covers proceeding, lunches, coffees, banquet and all social events)	Dates and Payment			\$/ Person (US\$)	Total \$ (US\$)	
	Author / Non-Author (All authors are required to register before February 15, 2010)	Before February 15, 2010		\$ 590.00	\$	
		After February 15, 2010		\$ 690.00	\$	
	Accompanying Person (reception, banquet, technical visit)			\$ 120.00	\$	
	Student (must be verified by student ID)	Before February 15, 2010		\$ 350.00	\$	
		After February 15, 2010		\$ 400.00	\$	
Additional Social Events Tickets for Accompanying Persons May 24, 2010 Welcome Reception May 27. 2010 Banquet May 24~28, 2010 One Lunch per person per day			No. of Persons	\$/ person/day (US\$)	Number of days	Total \$ (US\$)
				\$55.00	1	\$
				\$65.00	1	\$
				\$25.00		\$
TOTAL PAYABLE					\$	
<input type="checkbox"/> Off-line Payment by Credit Card:						
<input type="checkbox"/> Type of Credit Card: <input type="checkbox"/> VISA <input type="checkbox"/> MasterCard						
Card Number <input style="width: 300px;" type="text"/>						
Expiration Date:(month/Year) ____ / ____						
Card Security Number(CVC code number) in 3 digits in the back side of your credit card:_____						
<i>I hereby authorize the use of my credit card for the purposes specified above</i>						
Card Holder's Name: : _____						
Date: _____			Signature: _____			
(Signature is required for credit card payment)						

FraMCoS-7 REGISTRATION FORM for Bank Transfer Payment

Please return the completed form with signature by Fax after your bank transfer;
Fax No.: +82-2-364-4770

7th International Conference on
Fracture Mechanics of Concrete and Concrete Structures
Seogwipo KAL Hotel, Jeju, Korea, May 23~28, 2010

Or if you would send this form by email,
first fill out the form with signature and then scan it. Then, send the scanned file by email. E-mail: secretariat@framcos7.org

Only one delegate per form (photocopies may be used). Please type or print in block lettering.

<input type="checkbox"/> Speaker <input type="checkbox"/> Non-speaker <i>Please mark an "X" in an appropriate box. Choose only one.</i>	Surname: Ms / Mr / Dr / Prof		First Name(s):				
	Title:		Institute/Company:				
	Mailing Address:			Email:			
	City/Postal code		Country		Phone (+) Fax No.(+)		
If you are one of the authors:	Paper No.		Paper Title:				
Accompanying Person(s)	Surname Ms / Mr / Dr		First Name(s)				
Registration (covers proceeding, lunches, coffees, banquet and all social events)	Dates and Payment			\$ / Person (US\$)	Total \$ (US\$)		
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		After February 15, 2010		\$ 400.00	\$		
Additional Social Events Tickets for Accompanying Persons				No. of Persons	\$/ person/day (US\$)	Number of days	Total \$ (US\$)
May 24, 2010 Welcome Reception					\$55.00	1	\$
May 27. 2010 Banquet					\$65.00	1	\$
May 24~28, 2010 One Lunch per person per day					\$25.00		\$
TOTAL PAYABLE							\$
<input type="checkbox"/> Payment by Bank Transfer: <u>Name of Bank:</u> CITI BANK KOREA INC.; <u>Swift Code:</u> CITIKRSX; <u>Account No.:</u> 186-00166-245-01; <u>Name of Bank Holder:</u> Korea Concrete Institute-FRAMCOS; <u>Address of Bank:</u> New Building, The Korea Science & Technology Center, 635-4, Yeoksam-dong, Kangnam-gu, Seoul, 135-703, Korea; <u>Total Amount:</u> US\$:							

Date: _____ Signature: _____

♣ Conference Venue and Hotel Accommodation

The FraMcoS-7 conference will be held at the Seogwipo KAL Hotel located in Seogwipo-city of Jeju island in Korea. The Seogwipo KAL Hotel is located on the southern coast of Jeju Island where the exotic surroundings are magically harmonized with the breath-taking scenery of the beautiful ocean view and spectacular mountain view. The Seogwipo KAL Hotel is 45 km from Jeju International Airport and only 5 km from Seogwipo harbor.

- ♣ Location: 486-3, Topyeong-dong, Seogwipo-city, Jeju-do, Korea
- ♣ Local Contacts to the Hotel: Tel: +82-64-733-2001
- ♣ Reservations: +82-2-310-6677 ; Fax: +82-2-310-6680
- ♣ Internet Home Page: <http://www.kalhotel.co.kr>
E-Mail Address: rsvn@kalhotel.net (for reservation)
- ♣ Airport Limousine Buses (Bus No. 600) run every 15 minutes between the airport and the hotel from 6:20 a.m. to 10 p.m.

Please visit the conference website (<http://www.framcos7.org>) for hotel reservation with specially-discounted room rates. The hotel reservation form can be downloaded from the conference website. For your easy reference, the hotel reservation form is also attached here on the following page. You need to send the Hotel Reservation Form with signature directly to the hotel via Fax: +82-2-310-6680.

Please fill in this Hotel Reservation Form with signature and send it to the Hotel via Fax: +82-2-310-6680. Or if you want to send this form by email, first fill out the form with signature and then scan it. Then, send the scanned file by email. E-mail: rsvn@kalhotel.net

HOTEL RESERVATION FORM

FraMCoS-7

Seogwipo KAL Hotel, Jeju, Korea; May 23-28, 2010



Name:(Prof/Dr/Mr/Ms) : _____
 Affiliation : _____
 Address: _____
 : _____
 Tel:+ _____ Fax:+ _____
 E-Mail: _____

A block of rooms at **Seogwipo KAL hotel** is reserved for the FraMCoS-7 participants. Please check the boxes and return this form as early as possible because of the limited availability with this special conference rates. The conference special rates are valid until March 31, 2010. After this date, the reservation can be made only if there are rooms available.

Seogwipo KAL Hotel☆☆☆☆☆ (Conference Venue):

Twin/Double : US\$110/night(Single Occupancy)

US\$130/night(Double Occupancy)

*Room rates include breakfast, service charge & taxes.

DEPARTURE/ARRIVAL INFORMATION

- Check in Date: _____, Flight No. & Time: _____

- Check out Date: _____, Flight No. & Time: _____

One night deposit for hotel reservation

Credit Card : Visa; Master Card; Amount: US\$ _____

Card No. : _____ Expiry Date : / /

CVC Code : _____ Cardholder's Name : _____

Date : _____ Signature : _____

♣ Detailed Instructions for Oral Presentation

Presentation Time

Each paper in a parallel session is allocated a total of 18 minutes including oral presentation and discussion. It is kindly requested that the speakers keep the time schedule strictly.

Audio-Visual Equipment

- * **Only Microsoft Powerpoint(*.ppt) files can be accepted.**
- * **All authors and speakers are required to send their presentation ppt files to the Conference Secretariat before May 15, 2010 by e-mail attachment (framcos7@naver.com).**
This will expedite smooth process of presentation and avoid unnecessary delay due to file switching.
- * **Please also bring your ppt file in USB memory in case of any problem with your file.**
- * The mounting of Powerpoint file on the designated notebook computer should be completed at least one session in advance.
- * Powerpoint pre-view facilities are available in the Preview Room.

Official Language

The official language of the conference is English. All papers shall be written and presented in English.

♣ Social Events

Interesting social programs and accompanying persons programs will be arranged. The participants will enjoy not only the academic/technical presentations and discussions, but also various social programs during the conference. The following exciting social programs are scheduled.

Welcome Reception

- * **Schedule: May 24 (Monday), 2010, 19:00-21:30 p.m.**
- * **Place: Seogwipo KAL Hotel**

All the conference participants and accompanying persons registered for the conference are invited to the Welcome Reception. A meal and drinks will be served in an informal atmosphere. The Welcome Reception will provide an ideal opportunity to meet new friends and to rekindle old friendship. Some short welcoming speeches will be arranged during the reception.

Banquet

- * **Schedule: May 27 (Thursday), 2010; 19:00-22:30 p.m.**
- * **Place: Outdoor Terrace on the Sea Side at Seogwipo KAL Hotel**

The Conference Banquet will be held at the outdoor terrace on the sea side at Seogwipo KAL Hotel where the scenery is really magnificent. During the banquet, the participants will enjoy the traditional Korean arts performances

The vegetarian must reserve their seats by the afternoon of May 24 (Monday) at the Registration Desk. A vegetarian menu will be prepared and served for participants who desire it. Advanced ordering is required.

Outdoor Visit

*** Schedule: May 26 (Wednesday), 2010; 14:00~18:00 p.m.**

*** Place: Beautiful spots in Jeju Island**

The organizer will take participants to beautiful places to enjoy the natural beauty of Jeju Island. This will be another exciting and memorable event for conference participants.

♣ Social Program for Accompanying Persons

Half-day tour and full-day tour programs will be arranged for the accompanying persons. Detailed tour programs will be available on the registration desk with the places to visit and prices. Various beautiful places will be arranged. Minimum of around 10~20 persons will be required for the tour programs.

♣ How to Reach Conference Venue

Those who are coming from America or Europe may come via Incheon International Airport(IIA)-Seoul, which is one of the largest Hub Airport in the world. There are only a few flights from Incheon International Airport to Jeju International Airport. Mostly, the airplanes for Jeju depart from Gimpo Domestic Airport in Seoul city. It will take about one hour from Seoul to Jeju island. Jeju is also directly accessible from the major cities in northeast Asia, such as Tokyo, Osaka, Beijing, Shanghai, and Taipei, etc. The detailed information for transportation to Jeju and the conference venue is as follows.

(1) To Seoul (Incheon International Airport) from Overseas

Those who are traveling from America, Europe, and other countries may come via Incheon International Airport(IIA)-Seoul, which is one of the largest HUB Airport in the world.

(2) Seoul ↔ Jeju Island (Jeju International Airport)

Currently, there is no direct flight from Incheon International Airport(Seoul) to Jeju International Airport except in the morning (08:20 a.m.) of May 23(Sunday)(by Asiana Airline). Therefore, during other hours, you should go to the Gimpo Domestic Airport in Seoul city to get to Jeju International Airport. For transfer from Incheon International Airport(Seoul) to Gimpo Domestic Airport(Seoul), buses, limousine buses, trains and taxis are available. In frequency-wise, buses or limousine buses are most convenient. Trains which serve every 30 minutes are also convenient.

Please check the stop locations at Incheon International Airport for buses, limousine buses, trains and taxis for Gimpo Domestic Airport. It will take about roughly 40 minutes from Incheon Interantional Airport to Gimpo Domestic Airport. The flying time from Seoul (Gimpo Airport) to Jeju International Airport is about one hour.

(3) To directly Jeju Island (Jeju International Airport) from Overseas

Jeju international airport is directly accessible from the major cities in Northeast Aisa, such as Tokyo, Osaka, Beijing, Shanghai, and Taipei, etc. The participants from Europe, America, and other countries may check with travel agencies in their countries about the easiness and accessibility of using these cities to get Jeju directly.

(4) To the Hotel from Jeju International Airport

By Taxi; It will take about 50~60minutes from Jeju International airport to Seogwipo KAL hotel (the conference venue) and the cost is about ₩35,000 (US\$ 35).

By Airport Limousine; Taking Airport Limousine Buses (bus number 600) is more economical way. The bus leaves Jeju International Airport every 20 minutes and the journey takes about one hour and 20 minutes. The fair is about ₩5000(US\$ 5). The bus serves from 06:30 am to 10:00 pm. When you walk out of the airport building, turn left and walk about 100m. Then you will find the stop location for the bus numbered “600”. (Please check the stop location for bus number 600 when you are out from the airport building and check if the bus goes to Seogwipo Kal Hotel).

♠ General Information

Passport & Visa

Any foreigners wanting to enter the Republic of Korea must have a valid passport. Participants requiring an entrance visa should apply to Korean Consulate in their countries prior to departure. For details, please contact travel agents.

Currency & Credit Cards

The unit of Korean currency is the Won (indicated as won). One US dollar is equivalent to about 1,110 won in early May 2010. Foreign bank notes and traveler's checks can be converted into Korean Won at the banks located at the lobby of Incheon International Airport and at major tourist hotels. Major credit cards such as Visa and Mastercard are acceptable at most stores and hotels.

Electricity

In Korea, normally electricity of 220 volts is used. Check the power supply before using equipment.

Weather

Normally, the weather is pleasant in May in Jeju with an average temperature of around 20°C(68°F), ranging from 15°C(59°F) to 25°C(77°F).

Tipping

Tipping is not a traditional Korean custom. A 10 percent service charge is usually added to your bill at all tourist hotels. It is not necessary to tip a taxi driver unless he assists you with luggage or provides an extra service.