

Annual Report

**Department of
Architecture and Building Engineering
Tokyo Metropolitan University**

2015

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OVERVIEW OF RESEARCH ACTIVITIES

ARCHITECTURAL PLANNING/ CITY PLANNING

Kenji TAKEMIYA

1. Study on Care and Support Environment for Severe Disabilities

This study aims to clarify the characteristics and architectural planning of facilities for severely deformed child. This year some remarkable results were got as follows:

- 1) Actual usage of the facilities for orthopedically-impaired children in transition to new system.
- 2) Spatial configuration and facility management of short-term stay facilities for severe disabilities.
- 3) We made the survey of outpatient day room in day care facility for severely disabled children, and we discussed on the care environment configuration in the day room.

2. Residential Care System and Milieu for the Elderly

This study aims at improving the quality of living environment for the elderly. This year, some remarkable results were got as follows:

- 1) The facility planning and management of small scale multifunctional care facilities.
- 2) Analysis of space utilization for terminal and bereavement care in nursing care facilities and rented accommodations.

3. Study on Regional Comprehensive Care Ward

We conducted a questionnaire survey to understand the development status of the Regional Comprehensive care ward in Japan, and derived the knowledge of a new ward plan from the Survey of pioneering regional comprehensive care ward.

4. Study on Architectural Planning of Kindergarten

We conducted actual usage survey of kindergarten that have distinctive building and garden, and organized the knowledge for architectural planning.

These studies are to be published in Summaries of Technical Papers of Annual Meeting, A.I.J.

Tohru YOSHIKAWA

1. Development of Methods for Analyzing Network of Community Facilities

Tohru YOSHIKAWA, Tatsuya SUZUKI (JSPS) and Ryo SANUKI

In Japan, reconstruction of community facilities network is demanded by social informatization, aging and maturation. To provide theoretical models and examples of the reconstruction planning, convenience of community facilities and their most suitable placement were analyzed. During this year, the results of the analysis on relationship between the accessibility to regional facilities, especially food facilities, and population distribution were summarized.

2. Development of the evaluation method for the existing building stock on the basis of location

Tohru YOSHIKAWA

It is the problem important to our country, which is leaving for the low birthrate and aging society, to utilize a large quantity of buildings accumulated after the war as effective social property. To this end, methods easy to use for evaluating the existing building stock easily would be effective. Therefore, this study aimed at the development of the

method to evaluate existing stock buildings based on the location. In this year, the characteristics of consumer surplus and numbers of visitors as evaluation indexes of social benefit for facilities with distance decay of utilization ratio were theoretically analyzed.

Masumi MATSUMOTO

1. Studies on Sustainable Living of Elderly People in their Local Communities

Masumi MATSUMOTO

This series of studies aims to research on the living environment of elderly people who continue to live in the same community, and to research and develop supporting systems for such people.

- 1) Research using sensors to monitor elderly people's behaviors in their homes.
- 2) Research on community salons and support for senior citizen.
- 3) Research on various community activities for elderly people and their relationship with the professionals working in community comprehensive care centers.

2. Studies on Regeneration and Revitalization of New Towns

Masumi MATSUMOTO

Tama New Town is the largest new town developed over 40 years ago in Japan. This series of studies aims to research and develop the methods for regeneration and revitalization of living environment of new towns, mainly exemplified by Tama New Town.

- 1) Research on housing conditions and lifestyles in Kaitori - Toyogaoka District of Tama New Town.
- 2) Research on neighboring commercial areas of Tama New Town.
- 3) Studies on governing body of an old condominium apartment.
- 4) Studies on community activities initiated by women residing in Tama New Town.

(3) Studies on the Positioning of Interior Design in Housing Design Processes

Masumi MATSUMOTO

Conducted hearings to architects on the design making processes relating to housing designs.

ARCHITECTURAL DESIGN AND HISTORY

Masao KOIZUMI

1. Research on Accessibility of Urban and Architectural Space

Masao KOIZUMI

The First Stage of the Research is to analyze the Relationship between Housing and the City. This Research will be generalized into an Analysis of Relation between Architecture and Urban City.

These Researches will cover Areas such as; Type of Connection and Distance between Housing and the City, an Arrangement of Territories, Strength of the Boundary between Different Territories, etc. These Basic analyses will be developed into Research and Practice of a Design Method concerning Accessibility in an Urban Scale.

2. Research on Housing Transformation Reflecting the Change of Family

Masao KOIZUMI

Today a Family Style has transformed because of an Increase of Divorce and the rapid Progress of the Aging Society. But still most of the Houses are planned for so called "Nuclear Family".

The Goal of this Research is to develop a Planning Method for Housings and propose a new Typology, through the Analysis of Contemporary Japanese Family and their Life Style. Collective Housing will be a main Target for this Theme.

Katsuhiro KOBAYASHI and Akira KINOSHITA

1. Analyses on Composition of Modern and Contemporary Architecture

Katsuhiro KOBAYASHI, Akira KINOSHITA

One of the main purposes of architectural design research is to clarify morphological principles that give birth to architectural beauty. For this purpose, it is important and effective to abstract compositional principles and compositional methods from existing architectural works and to examine the design principles. In the academic year of 2015, designs of recent high-rise buildings, domestic works of Alva Aalto and unbuilt projects of deconstructivist architects were analyzed. Research on recent high-rise buildings was published as a book titled "Skyscrapers-Challenges of High-rise Buildings in the World" in Aug. 2015.

2. Development of Architectural Design Method

Katsuhiro KOBAYASHI, Akira KINOSHITA

In architectural design research, it is also important to apply design principles and compositional methods abstracted by analyses to actual architectural design works. Thereby theory and practice, in other words, basic research and high-level application would be synthesized. In the academic year of 2015, relations between theory and design practice were pursued through three design works of our master program students.

3. Research on Design of Architectural Conversion

Katsuhiro KOBAYASHI, Akira KINOSHITA

It is becoming one of the crucial social subjects in the architectural field of Japan to find out various methods to revitalize the existing building stocks. Among these methods, architectural conversion is very useful and important. For these several years, we have made research survey on architectural conversion abroad. In the academic year of 2015, we published research results of the previous year in Summaries of Technical Papers of Annual Meeting, A.I.J. and made investigations on converted buildings in Italy (Venice, Milano, Torino, Roma and Florence for two weeks, from Sept to Oct.), India (Delhi, Jaipur and Mumbai for ten days, from Oct. to Nov.), and New York (Oct. to Nov.).

4. Study on English Baroque Architecture

Akira KINOSHITA

The perception of landscape or scenery is recognized as more important factor in the phase of urban development today. Whereas to perceive the design of architecture with the relation to its surrounding environment is more valued than the physical features of the building. In this research, the texts written by Sir John Vanbrugh, a 18th century British architect and dramatist, who implicitly expressed the concepts of landscape architecture in the early era. Sir John Vanbrugh had been famous comedy dramatist before he started his career as an architect. Here in this study we focused on the plots of the play, "Journey to London", the last work of Vanbrugh. In the play, the causes of laughter are generated by the variety of gaps between countryside and the city, such as; sophistication and vulgarity, corruption and naivety. Such structure of the play suggests that in the concept of the landscape beauty underlies the perception of countryside from the urban citizens' point of view. In the course of the study how the concept of landscape was evolved is examined comparing it to the enormously inflating city of London, absorbing massive amount of people from the countryside, as the background.

Yukimasa YAMADA

1. Studies on the Architectural History of Catholic Churches in the Northern Vietnam

Yukimasa YAMADA

Christianity in Vietnam, since its introduction early in the sixteenth century, has been evolving and expanding to an indigenous culture among the society, convention and thoughts different from European countries. We are focusing attention on three Catholic dioceses that have been played most important rolls in the history and culture of Christianity in the Northern Vietnam, Bui-Chu diocese, Thai-Binh diocese and Phat-Diem diocese. Collaborating with the liaison section of each diocese, we attempt to conduct surveys and analysis of existing historical churches, supported by JSPS KAKENHI Grand-in-Aid for Scientific Research (A). In this fiscal year, we tried to focus on non-wooden churches in Phat-Diem diocese, and also discussed their architectural characteristics like planning and façade design, based on the field survey in August 2014. And we submitted some papers to ICOMOS Thailand International Conference 2015 (CIAV+ICTC 2015), Bangkok, Thailand, and the annual meeting 2015 of A.I.J.

2. Studies on Conservation and Utilization of Historical Buildings in Japan

Yukimasa YAMADA

The trends in conservation and utilization of historical buildings under the law for the protection of cultural properties are changing recently with establishing the registration system for cultural properties in 1996 and the landscape law in 2004. In this fiscal year, based upon a nationwide questionnaire survey, we tried to make an analysis on the level of understanding and prevailing of the registration system for cultural properties and we reported it at the annual meeting 2015 of A.I.J.

3. Studies on Historic Architecture and Urbanism in the Islamic World

Yukimasa YAMADA

Although numbers of the historic architecture in the Islamic world have their own peculiar features in the architectural techniques and designs, their nature has not yet been understood adequately in Japan, nor has their urbanism as their agglomeration. In a series of our successive studies on the architectural history and urbanism in Islam, we discussed the historical background and changes regarding mosques management system in China, this fiscal year.

CONSTRUCTION MANAGEMENT AND BUILDING MATERIALS

Yoshinori KITSUTAKA and Koichi MATSUZAWA

1. Effects of Heating and Carbonation on Fracture Properties of Concrete

Yoshinori KITSUTAKA and Koichi MATSUZAWA

With a focus on the strength and durability of concrete subjected to a combined effect of heating and carbonation, the authors investigated its crack resistance by conducting fracture toughness tests on mortar specimens. Followings are conclusions, (1)The strength of specimens cured at 20°C is higher than that of specimens at an age of 4 weeks, but the strength development tends to be constrained by carbonation.(2)The strength of specimens cured at 65°C is lower than that of specimens at 4 weeks, but significantly becomes higher after carbonation.(3)The strength of 20°C-cured specimens may be increased by carbonation at later ages.(4)The softening rate of specimens with increased strength tends to be high. For this reason, their fracture energy remains low despite their high flexural strength and initial cohesive stress.

2. Concrete Carbonation Protection Performance of Finishing Materials Containing Calcic Powder

Yoshinori KITSUTAKA and Koichi MATSUZAWA

Slaked lime powder binds to CO₂ in the atmosphere to form calcium carbonate, contributing to further hardening. This process can reduce the amount of CO₂ that acts on concrete. In other words, the presence of slaked lime on the surfaces causes sacrificial carbonation, thereby inhibiting carbonation of internal concrete. This study is intended to elucidate the carbonation-inhibiting effect of finishing materials containing slaked lime powder. A finishing coat on mortar has a carbonation-inhibiting effect in comparison with no coating. The carbonation-inhibiting effect of slaked lime is not clearly observed when added to cement paste as a coating material with a low permeability, but which can be obtained by adding an appropriate amount of slaked lime to a thin-painting finish coating material with a high permeability.

3. Influence of Coarse Aggregate Types on Fracture Properties of Concrete Subjected to High Temperature Heating

Koichi MATSUZAWA and Yoshinori KITSUTAKA

In this research, the influence of coarse aggregate types on the fracture properties of concrete subjected to high temperatures up to 800°C was reported. The fracture properties were evaluated based on tension-softening curves which were determined by polylinear approximation through inverse analysis. The follow conclusions were found: The initial cohesive stress of concrete containing sandstone, granodiorite, and chert slightly increased, while those of limestone slightly decreased at 100°C, and at higher temperatures, the initial cohesive stress of all specimens decreased. The fracture energy of all specimens increased up to a heating temperature of 300°C but then tended to decrease.

Makoto TSUNODA

1. Studies on Activation Technique of Public Building Stock

Makoto TSUNODA

In Japan, demolition and new construction based on declining in the durability and increased availability of buildings continues to be practiced. This practice is unfavorable from the viewpoint of utilization of the existing building stock. Activation technique is necessary for leading preservation and improvement of the public property.

In this year, from the arranging of investigation stage of the individual facility maintenance by the unification of facilities' information that dispersed in the local government, we built the examination method of maintenance based on a quantitative index. At first, we clarified concrete examination content in the planning stage of single project from comparison of the information item such as quality and function of facilities. In addition, about comparison items, we made the evaluation standard using objective index.

2. Organization of Subcontractor for Stock Housing

Makoto TSUNODA

Contents of improvement, such as reform, were diversified in requirement of residents. Therefore, the details of construction and its cost were complicated. As regards realization stock-based societies, the productive organization of effective utilization for stock housing, especially contribute to residential requirement were in urgent need. And it was necessary to creating the local housing construction network owing to sustainable improvement.

In this year, we paid attention to the improvement of water section of detached house, we clarified that the necessary occupation varying according to difference in repair works, and the occupation to take the initiative by repair contents. In addition, we considered the possibility of multi-skilled worker who carried out plural activities across construction contents. Furthermore, we arranged construction contents in the repair work of the existing house and grasped a workflow and the problems every occupation to affect it. and clarified policy for efficiency of construction process.

3. Research on How to Configure the Renovation Construction Methods Corresponding to the Building Stock

Makoto TSUNODA

Although we were supported by using the formulas of the various construction system for performance was required in new construction, there is a completely different conditions in terms of new construction and renovation that are present in a pre-existing condition. And that the work of the components to the contents of the construction methods in new construction is not seen to reflect. Therefore, there is some relationship between the role of members in the construction methods and improved performance as a result of each repair. In the renovation, it is considered that the contents of the construction system are particularly reflected in the constituent members to direct.

In this year, we focused on construction performance in building system of exterior wall on the wooden detached house and showed the way of required improvement building system in future. We grasped diagnosis part and diagnosis contents of external wall in existing house and clarified adjustment contents necessary to attach new external wall materials. Furthermore, we showed construction process from the diagnosis of the existing part to detailed adjustment, and the form that a resident, building materials maker, a builder could participate in as improvement process superior to constructability flexibly was more necessary.

4. Studies on methodology of the building improvement to be compatible with value of property and utility.

Makoto TSUNODA

It is not unusual for an available building to be removed for some reason. As a removal reason, completion original performance cannot maintain and use of building changes. There are various things in reproduction technique to resolve these situations. So far to improve the property values when we extend the life of an existing building, maintenance and improvement of various performances and addition of the new performance that does not hold it are required. Similarly, to improve the utility value, physical changes of the building it and the function changes such as the usage of building are required. These two value improvement does not become independent each, and renovation program of the building should be drafted after having considered the trade-off of both. Various renovation techniques are seen in today, but the technique that included plural value improvement to advance building renovation of building are the urgent need.

The result of this year is as follows.

We grasped the actual condition of the interior finishing work that a resident participated in dwelling unit of condominium in China and clarified about "Do it resident's oneself" in the renovation. It is necessary for realization of the resident participation in the interior finishing production of dwelling unit that the content of the operations for each stage

were changed and auxiliary business by an interior finish contractor supplementing the ability of the resident were existed. In addition, the related occupations were complicated, and the possibility that difference in intention occurred, we showed that the communication between contractor and resident and enough explanation were important.

We paid attention to information in the rental apartment house of customized model, and we clarified how possible is the repair by the borrower. We suggested technique to derive repair levels from finish contents and construction degree of difficulty. In addition, the repair menu which we derived to increase the rental houses of the customized model as reporting of the landlords were useful thing.

From field survey of the demolition works with the renovation, we clarified the actual condition of construction and showed the prior examination item which was useful for reduction in labor for demolition. In addition, the partial demolition were effective for reduction in labor and we clarified prior examination items of partial demolishing and made demolition work flow.

Tomoyuki GONDO

1. Conventional House Production System in Asian Countries

Hirotake Kanisawa, Tomoyuki Gondo, Kazuya Shide

In South-East Asian country, we expect active house production. In Vietnam, from the interviews with several architects, construction teams, building parts suppliers, we made clear the building system of conventional RC and brick construction. In Thailand, we focused on the increase of high rise condominiums, and investigated the maintenance system of them.

2. Lack of Skilled Workers and Necessity of Industrialization

Shuichi Matsumura, Hirotake Kanisawa, Tomoyuki Gondo

To deal with the lack of skilled workers, we record several problems in construction site of an industrialized house builder, and propose some improvement plan. In Singapore, the government strongly push forward to industrialize construction to reduce the number of foreign workers. We investigated the contractor's action toward the law in Singapore.

STRUCTURAL ENGINEERING

Kazuhiro KITAYAMA

1. Seismic Performance and Different Limit States for Prestressed Reinforced Concrete Cruciform Beam-Column-Slab Subassemblage Forming Beam Yield Mechanism

KITAYAMA Kazuhiro and JIN Kiwoong

An ultimate objective of this study is to propose estimation method which can evaluate easily deformation capacity at different limit states with good accuracy for prestressed reinforced concrete (PRC) flexural beams, eventually aiming to formulate a performance-based seismic design methodology for PRC buildings.

Actual buildings have both slabs and transverse beams. Therefore, three beam-column-slab subassemblage specimens with transverse beams were tested in 2014 under cyclic load reversals to investigate hysteretic characteristics and the process of damage for PRC beams with slabs. A surface deformation along post-tensioning tendons, i.e., a plain bar or a deformed bar, and a contribution ratio of post-tensioning tendons to ultimate bending capacity for a PRC beam section (hereafter called a PT-ratio) were varied for specimens.

All specimens failed in beam flexure. Lateral force capacity attained to the peak for all specimens at or after yielding of post-tensioning tendons, after beam longitudinal bars yielded in tests. Concrete crushing at beam ends and buckling of longitudinal bars occurred for a beam using post-tensioning plain tendons. Crack patterns in slabs were almost same for subassemblage specimens with plain or deformed beam tendons regardless of poor or good bond along post-tensioning tendons. Following findings were obtained from the study.

- (1) Regardless of a PT-ratio and bond conditions along post-tensioning tendons, the effective width of a slab on beam flexural capacity attained to 0.1 times the beam span length, which is provided by the AIJ Standard for Structural Calculation of R/C Structures, before a beam deflection angle of 0.3%, and reached 0.2 times the span length of the beam before lateral force capacity attained to the peak.
- (2) When a PT-ratio was set to be approximately 0.4 or 0.8 under top or bottom tension of a T-shaped section respectively, a maximum ratio of a residual deflection to a peak deflection for the beam became greater than 0.5 or less than 0.1 respectively, exhibiting remarkable difference in a residual deflection. Even if slabs are placed to a beam top, damage level, a residual deflection, a residual crack width and equivalent viscous damping ratio for a T-shaped-section beam were almost same under top and bottom tension of the beam, when both PT-ratios are set to be greater than 0.5 under top and bottom tension.
- (3) Bond along a deformed post-tensioning tendon, which was good comparing with that along a plain tendon, deteriorated due to strain concentration at a beam critical section before lateral force capacity attained to the peak. Transverse beams enhanced the bond capacity along beam longitudinal bars within a beam-column joint due to those confining effect to a joint panel.
- (4) A residual deflection and a residual crack width of a PRC beam grew large with good bond along tendons and longitudinal bars when post-tensioning tendons yielded prior to beam longitudinal bars. The greater a PT-ratio was set to be, the more remarkably this tendency was observed.
- (5) A residual deflection, a residual crack width and equivalent viscous damping ratio for a PRC beam predicted by “Guidelines for Structural Design and Construction of Prestressed Concrete Buildings Based on Performance Evaluation Concept (Draft)” agreed approximately with test results. However, more studies are needed to improve the accuracy.
- (6) A point on a skeleton curve in force-deflection relationship for a PRC beam corresponding to a first restorable limit state determined by elastic limitation or yielding of post-tensioning tendons coincided almost with a point where abrupt decline of a stiffness occurred. Points corresponding to a second restorable or safety limit state determined by core concrete crushing coincided almost with a point where load-carrying capacity decreased. A safety limit state for a T-shaped-section beam under top tension was attained due to concrete crushing at a bottom of the beam end.

2. Seismic Performance and Ultimate Flexural Capacity Evaluation Based on 3D Joint-Hinging Failure Model For R/C Corner Column-Beam Joint Subjected to Tri-Directional Loading

KITAYAMA Kazuhiro

Static loading tests to two reinforced concrete (R/C) three-dimensional (3D) corner column-beam subassembly specimens were carried out by Katae and Kitayama (2014) to investigate the effect of column compressive axial load on failure mechanics of joint-hinging proposed by Shiohara at the University of Tokyo. The Shiohara's proposal pointed out that failure mode of a R/C beam-column-joint frame depends greatly on the ratio of an ultimate flexural capacity of a column section to that of a beam section at a center of a beam-column joint (called a column-to-beam capacity ratio hereafter) and joint-hinging failure tends to develop when a column-to-beam capacity ratio is close to unity. Note that a column-to-beam capacity ratio can be varied by changing not only the magnitude of column axial load but also the amount of column longitudinal reinforcement.

Therefore three 3D corner column-beam subassembly specimens (two without slabs and one with a slab having a thickness of 70 mm) were tested in 2014 under bi-lateral loading and constant column axial load where a column-to-beam capacity ratio of 1.5 and 2.6 was set by placing column longitudinal reinforcement of 8-D16 (SD295A) and 8-D19 (SD490) respectively. Column section was reduced to a depth of 300 mm from 350 mm for specimens in 2014. Beam longitudinal reinforcement was mechanically anchored by an end plate within joint concrete with a horizontally projected length of 255 mm corresponding to 0.85 times the column depth. Concrete compressive strength ranged from 75 to 78 N/mm². All 3D corner column-beam subassembly specimens with/without slabs failed in joint-hinging with an increase in story drift.

It is revealed by Katae and Kitayama (2014) that the ultimate flexural capacity of corner column-beam joints under bi-lateral loading can be estimated based on the new mechanism of joint-hinging by assuming that the orbit on the rectangular coordinates plane defined by joint-hinging capacities in both directions orthogonal to each other traces an ellipse curve under bi-lateral loading. Three-dimensional (3D) failure surfaces and stress flow conditions in a corner column-beam joint subjected to bi-lateral loading, however, are not clarified yet. Then a 3D joint-hinging failure model was constructed for a corner column-beam joint based on test results referring to a plane joint-hinging failure model proposed by Kusuhara and Shiohara. A quick evaluation method for the ultimate joint-hinging capacity was proposed based on the 3D failure model in a corner column-beam joint under bi-lateral loading.

General conclusions are drawn from the study as follows.

- (1) When a column-to-beam capacity ratio increased from 1.5 to 2.6, the ultimate joint-hinging capacity computed as a resultant force of two orthogonal story shear forces under bi-lateral loading increased to 1.19 times by large amount of column longitudinal reinforcement. This indicates that the ultimate joint-hinging capacity was enhanced by the increase in a column-to-beam capacity ratio due to increasing the amount of column longitudinal reinforcement.
- (2) When a column-to-beam capacity ratio was changed from 1.5 to 2.6 by the increase in the column compressive axial load in past tests or the amount of column longitudinal reinforcement in this tests, the column compressive axial load had a greater influence on enhancement of the ultimate joint-hinging capacity under bi-lateral loading than the amount of column longitudinal reinforcement.
- (3) A slab contributed to enhancing the ultimate joint-hinging capacity by 1.07 times that without a slab for 3D corner column-beam subassemblies with a column-to-beam capacity ratio of 1.5, failing in joint-hinging. Torsional moment at the end of a transverse beam caused by tensile force of slab reinforcing bars in the longitudinal direction, whose rotating direction is counter to that of upper and lower columns, is carried to a beam-column joint and restrains rotation of the upper and lower columns. This is the reason for enhancement of the ultimate joint-hinging capacity due to a slab.
- (4) Proposed method based on 3D failure model herein can adequately evaluate the ultimate joint-hinging capacity of a corner column-beam joint under bi-lateral loading since there is a discrepancy within 10 % between predicted ultimate

capacity and test result.

3. Evaluation of Ultimate Flexural Strength and Deformation for Beams in Unbonded Precast Prestressed Concrete Cruciform Unit Frame

KITAYAMA Kazuhiro and JIN Kiwoong

In the precast prestressed concrete frame assembled by post-tensioning unbonded tendons with ungrouted sheaths, called an unbonded PCaPC frame, the beam rotates against the column face as a rigid body, causing remarkable opening at a connecting interface between a precast concrete column and a beam with scarce residual deformation. This can be achieved by the post-tensioning unbonded tendon, since its tensile strain is kept constant over the whole length. The unbonded PCaPC frame is designed as a strong column-weak beam system, so an accurate and simplified evaluation method for the ultimate flexural strength and deformation of the beam is necessary to mitigate earthquake damage. Attempts to estimate these values were carried out in previous studies. However, most studies dealt with an isolated beam removed from a moment-resisting frame, which cannot well reflect the precise seismic behavior of actual frames. In addition, they also require a complicated mathematical calculation.

In this study, therefore, a macro-model, which can reproduce the flexural behavior of the cruciform unbonded PCaPC subassembly, is proposed to evaluate the ultimate flexural strength and deflection of the beam, whose unbonded tendons are placed symmetrically at the top and the bottom in the beam section. An accurate and simplified estimation method for the ultimate flexural strength and deflection is then proposed based on the macro-model. These values predicted by the method are finally compared with previous experimental results to verify its validity. The proposed macro-model and general findings taken from this study can be summarized as follows.

- (1) In the macro-model, after an opening occurs at the beam-column interface due to bending moment, the beam rotates as a rigid body. Beam axial deformation resulting from compressive strain, which develops at the extreme compression fiber along the entire length of the beam, is supposed to concentrate on the beam end. Concrete on the compressive side of a beam is shortened at a tendon position, and the opening at the beam-column interface contributes primarily to elongation of the beam at a tendon position on the tensile side.
- (2) The evaluation formula for the ultimate flexural strength and deflection of a beam was proposed based on the plane section assumption at the beam end and the following conditions; the sum of axial deformation attributed to both the concrete shortening and the opening distance at the beam-column interface at the tendon position in a cruciform subassembly is equal to the total elongation of the tendon, and the tensile and compressive resultant force in a beam section is the same.
- (3) In the evaluation formula, the distance from extreme compression fiber to neutral axis in a beam section at the beam flexural strength, defined as x_n , is a crucial factor to calculate the beam strength and deflection. To obtain x_n , therefore, both an iterative method and a simplified manner were introduced.
- (4) Predicted ultimate flexural strength and deflection of a beam by the proposed method showed a good agreement with the previous experimental results. The discrepancy between the calculated and observed ultimate flexural strength remained in a range of $\pm 10\%$, and that of the ultimate beam deflection remained within $\pm 15\%$.
- (5) Since the distance x_n , obtained from the simplified manner aforementioned, tended to be slightly greater than that from the iterative method, the ultimate flexural strength and deflection of a beam by the simplified manner were found to be somewhat smaller than those by the iterative method. However, their discrepancy remained in a range of $\pm 5\%$ for both the ultimate flexural strength and deflection when the prestressing ratio of a tendon to its yield strength is greater than 0.6, which is generally accepted in an actual construction.

4. Earthquake Resistant Performance for Precast Prestressed Concrete Moment-Resisting Frame Assembled by Post-Tensioning Unbonded Tendons

KITAYAMA Kazuhiro, JIN Kiwoong and KANEMOTO Kiyomi (Shimz Corporation)

A beam-column joint hinging failure, which was proposed by Shiohara, has been broadly known for reinforced concrete (R/C) moment-resisting frames when an ultimate flexural capacity of a column section is close to that of a beam section in a R/C frame at the center of a beam-column joint. In contrast, for moment-resisting frames which consist of precast concrete beams and columns connected by post-tensioning unbonded tendons (called as a PCaPC frame), the joint-hinging failure is not verified through laboratory tests.

Therefore, in order to study on a failure mechanism of a beam-column joint in PCaPC frames, four interior beam-column subassembly specimens were tested under cyclic load reversals in 2014. Two plane specimens with a column-to-beam ultimate flexural capacity ratio of 1.3 or 2.1, one specimen with slabs alone and the other with both slabs and transverse beams having a column-to-beam ultimate flexural capacity ratio of 1.2 were used for tests. Column axial load of 800 kN (axial stress ratio of 0.15) was common. A joint shear capacity margin ranged from 1.3 to 1.5.

Conclusions drawn from the tests are summarized as follows.

- (1) A column-to-beam ultimate flexural capacity ratio did not govern seismic behavior such as relationship between story shear force and story drift for plane interior beam-column subassembly specimens since these specimens did not fail in joint-hinging but beam flexure caused by concrete crushing at beam ends.
- (2) Although a column-to-beam ultimate flexural capacity ratio was 1.2 for a subassembly specimen with slabs alone, the specimen did not fail in joint-hinging but beam flexure. In contrast, a joint panel rotation increased after peak lateral capacity and symptoms of joint-hinging failure were observed.
- (3) Damage to a beam-column joint in a 3D subassembly specimen was mitigated due to slabs and transverse beams covering a joint panel surface, showing beam flexural failure in spite of a column-to-beam ultimate flexural capacity ratio of 1.2.
- (4) Shear distortion and rotation occurred simultaneously in a joint panel even if damage to a beam-column joint was slight.
- (5) The effective width of a slab on beam flexural capacity exceeded 0.1 times the beam span length before a beam deflection angle of 0.3%, and reached 0.2 times the beam span length at a beam deflection angle of approximately 0.6%.

5. Flexural Behavior for Beams in Precast Prestressed Concrete Beam-Column Frame Assembled by Post-Tensioning Unbonded Tendons

KITAYAMA Kazuhiro and JIN Kiwoong

A final objective of this study is to propose an easy and explicit method which can evaluate both strength and deformation capacity at different limit states such as a yield and ultimate point for beams in a precast prestressed concrete frame assembled by post-tensioning unbonded tendons (called unbonded PCaPC), eventually aiming to establish a performance-based seismic design methodology for unbonded PCaPC buildings. Some loading tests have been conducted for unbonded PCaPC interior and exterior beam-column subassemblies in our laboratory to accumulate significant test data.

In the study, unbonded PCaPC cruciform beam-column subassemblies, which were designed to develop beam flexural yielding, were tested under cyclic load reversals to investigate those mechanical behavior and a failure process. A ratio of total tensile force induced to post-tensioning unbonded tendons to the product of a beam sectional area and concrete compressive strength (called a PC-steel ratio) was varied in the test.

Two plane specimens and a 3D specimen with slabs and no-loaded transverse beams were tested. A PC-steel ratio of beams was 0.09 and 0.17 for two plane specimens, and 0.09 for the 3D specimen. A column-to-beam capacity ratio of 2.3 and 2.6 was set by adjusting the amount of column longitudinal reinforcement respectively for plane specimens, and 1.9 for the 3D specimen. This was intended to prevent joint-hinging failure of a beam-column joint panel. Concrete compressive strength was 40 N/mm².

All specimens failed in concrete crushing at beam ends, showing an origin-oriented shape of hysteresis loops. Column longitudinal bars did not yield for all specimens. Lateral load-carrying capacity for a plane specimen with a PC-steel ratio of 0.09 reached the peak with concrete crushing at beam ends after strain of post-tensioning tendons exceeded the elastic limitation. Post-tensioning tendons yielded after the peak capacity for the specimen. Lateral load-carrying capacity for a plane specimen with a PC-steel ratio of 0.17 and a 3D specimen reached the peak when attaining to elastic limitation strain of tendons, after joint lateral hoops yielded and crushing occurred in cover concrete at beam ends. Effective width of a slab on the beam bending moment capacity increased with deformation of the beam, eventually developing yielding for almost all slab longitudinal bars at a story drift angle of 3 %.

6. Analysis of Two Reinforced Concrete Buildings with Different Earthquake Damage Level Regardless of Having Similar Seismic Capacity Indices

KITAYAMA Kazuhiro

A reinforced concrete (R/C) four-story class-room building in the H elementary school, which is located on the Hoshakuji-plateau at an eastern suburb area of Utsunomiya City in Tochigi prefecture, suffered moderate damage by the 2011 East Japan Earthquake. A Minimum value among the seismic capacity indices I_s for the building was 0.55 at the second story, which were less than 0.7 for the first to third stories. Damage by the 2011 Earthquake to another R/C four-story class-room building in the T elementary school which is only 3.9 km away from the H school, on the other hand, remained quite slight although a minimum value of 0.51 among the seismic capacity indices I_s was almost same as that for the H school building.

Then this study aimed to investigate the reason for the difference in damage level to two school buildings. For this sake, the seismic performance evaluation for two buildings was carried out according to the third level procedure which can take flexural and shear strengths of columns, walls and beams into account. Non-linear earthquake response analyses to three-dimensional frame models were conducted for two buildings using general-purpose computer software called SNAP. Findings taken from the study are summarized as follows.

(1) Column Shear failure classified as Grade 4 or 5 occurred in a longitudinal direction of the H school building. Damage of the building was classified into the moderate level at the second story in a longitudinal direction. In contrast, minor shear cracks occurred for a first-story column and a non-structural wall within a frame in the T school building. Damage of the building was classified into the slight level. Thus earthquake damage levels were obviously different from each other for these two school buildings.

(2) The seismic capacity index I_s measured by the second level procedure in a longitudinal direction ranged from 0.55 to 0.69 for the H school building and 0.51 to 0.69 for the T school building for the first to third stories, which were less than a threshold value of 0.70 required by the standard. Failure mechanisms for two buildings judged from the seismic performance evaluation according to the third level procedure were, in contrast, different from each other, indicating not column collapse mechanism but beam yielding mechanism for the T school building.

(3) Earthquake motions at the ground surface on the site of two schools were deduced from the equivalent linear analysis to take the magnification to earthquake motions due to a surface layer of soil into account. An acceleration record measured at 112 meters below the ground at KiK-net Haga Observatory located 7.4 km or 8.9 km away from the H school or the T school respectively was input to the engineering bed-rock surface for the analysis. Peak accelerations at the ground surface in the east-west direction were magnified by the soft soil from 173 gal under ground to 759 gal or 792 gal in the H school or the T school respectively. A predominant period observed in an acceleration response spectrum ranged from 0.05 to 0.15 second for predicted earthquake motions on the site of two schools. These mean that characteristics of two earthquake ground motions input to two school buildings resembled each other.

(4) Earthquake response analyses to three-dimensional frame models were carried out using acceleration time-histories obtained as mentioned above. Peak story drift angle in the second story reached the greatest value of 0.25 % among stories

for the H school building, corresponding to actual damage concentration on the second story. C-4 columns in the first to third stories and C-5 columns in the first and second stories failed in shear also for the analysis as same as actual damage to the columns. Results of the analysis agreed approximately with actual damage conditions for the H school building. On the other hand, though cracks developed in columns and walls in the analysis to the T school building, a beam failure mechanism was formed finally. Judging from the seismic performance evaluation due to the third level procedure and the earthquake response analysis to 3D frames, flexural yielding at beam ends in the T school building is a principal cause of slight damage to columns and walls by the 2011 Tohoku Earthquake.

7. Interaction between Seismic Retrofit and Damage to Piles for Reinforced Concrete Buildings

- Study Using Coupled System among Soil, Piles and Superstructure -

KITAYAMA Kazuhiro

Several reinforced concrete (R/C) buildings suffered damage under the 2011 East Japan Earthquake though seismic retrofit to those buildings was already carried out. Among them, there were R/C buildings which suffered not only minor or moderate damage to the superstructure, but also severe damage to the pile foundation.

A number of seismically retrofitted buildings whose foundation suffered minor or more damage was approximately one-quarter the total number of seismically retrofitted buildings, judging from field reconnaissance conducted by the Architectural Institute of Japan. This ratio was more than twice the damage ratio of non-retrofitted buildings whose foundation suffered minor or more damage. This was probably caused by the enhancement of lateral load carrying capacity of the superstructure due to seismic retrofit, leading to concentration of excessive stress to the pile foundation. Such seismic retrofit to the superstructure of R/C buildings tended to intensify damage to the pile foundation under earthquake excitation.

Therefore, earthquake response analyses were carried out using a coupled system among soil, piles and the superstructure to investigate the interaction between seismic retrofit and damage to the pile foundation for R/C buildings. A reinforced concrete three-story school building in Ichikai Town was chosen as an object of the analysis, which suffered moderate damage to the superstructure and severe damage to the pile foundation during the 2011 East Japan Earthquake regardless of seismic retrofit by means of steel-braced frames and eventually was demolished. Seismic performance of the superstructure of the building was already studied by Ishiki and Kitayama using earthquake response analyses to both a multi-degree-of-freedom system and a three-dimensional frame model.

For the analyses to an original building without retrofit and the building retrofitted by steel-braced frames, the Penzien type model was used. Masses of each floor in the superstructure and some segments divided arbitrarily along a pile length were lumped at the floor levels and the each point along the pile length respectively. A tri-linear model was used for an envelope curve in lateral force – drift relationship at each story, and an origin-oriented model or the Takeda model was chosen as hysteresis rules. Relationship between bending moment and curvature for piles was obtained by a section analysis under long-term axial load, and simplified to a tri-linear model based on the section analysis.

A response lateral drift obtained by the analysis was the largest at the third story among stories of the superstructure. A top of piles failed in flexure in the analysis. These results corresponded approximately to actual damage of the retrofitted building. Seismic retrofit of the superstructure increased flexural deformation at a top of piles comparing with the original building without retrofit. A ductility factor of curvature at a pile top increased greatly from 1.8 in the original building to 11.2 in the retrofitted building.

8. Earthquake Resistant Performance of Reinforced Concrete Building under Retrofit Construction Damaged by the 2011 East Japan Earthquake

KITAYAMA Kazuhiro

A reinforced concrete (R/C) three-story school building, located in Nasu town in Tochigi prefecture, which was

under construction for seismic rehabilitation using steel-braced frames suffered moderate damage under the 2011 East Japan Earthquake. A plan of the building is 108 meter long for the longitudinal direction, and the first term construction for seismic retrofit was completed but the second term construction was not conducted yet when the 2011 Earthquake attacked the building. Damage during the earthquake concentrated on a non-retrofitted area of the building; three R/C columns failed in shear and severe shear cracks classified as Grade 3 were observed for four columns.

Residual seismic capacity after the earthquake was estimated to be 0.77 times the original seismic capacity before the earthquake for the first story in the longitudinal direction. In this estimation of the residual seismic capacity, the damage grade for a steel-braced frame was assumed to be similar to that for a shear wall with boundary columns at both ends, which seemed to underestimate the residual seismic capacity. Thus the damage of the building was classified into the moderate level. In contrast, residual seismic capacity limited to a non-retrofitted area of the building was re-estimated to be 0.59 times the original seismic capacity, judging to be the heavy damage level.

Static push-over analyses were carried out for spatial moment-resisting frames of the school building in the longitudinal direction to investigate the reason why damages concentrated on a non-retrofitted area of the building. For the non-linear analysis assuming rigid floors, short columns located in a non-retrofitted area failed in shear, which was able to reproduce actual damages by the earthquake. Short columns located in a retrofitted area, which suffered slight damage, however, also failed in shear for the analysis. Lateral drift is equal at all nodes aligning at same floor level for the analysis assuming rigid floors. However it is probable that lateral drift was different at each node because of the long length of the building plan and enhancement of the stiffness due to installation of steel-braced frames.

Therefore using the un-rigid floor model, allowing in-plane shear elastic behavior for R/C slabs and elasto-plastic elongation of longitudinal R/C beams, static push-over analysis was carried out again. Shear failure of short columns located in a non-retrofitted area occurred earlier for the un-rigid floor model than that for the rigid floor model. Shear failure of a column located in a retrofitted area also occurred, but lateral drift of the column was smaller by 1.1 mm than that of columns located in a non-retrofitted area, expecting to trace actual slight damage of the column.

9. Seismic Performance and Damage by the 2011 East Japan Earthquake to Reinforced Concrete School Building Retrofitted by Steel-braced Frame

KITAYAMA Kazuhiro

A reinforced concrete three-story class-room building in the Ichikai junior high-school suffered moderate damage to the superstructure and severe damage to the pile foundation during the 2011 East Japan Earthquake regardless of seismic retrofit by means of steel-braced frames. This was caused by the enhancement of lateral load carrying capacity of the superstructure due to seismic retrofit, leading to concentration of excessive stress to the pile foundation. Such seismic retrofit to the superstructure of R/C buildings tended to intensify damage to the pile foundation under earthquake excitation.

On the other hand, a two-story special class-room building constructed in 1973, which is adjacent to the three-story class-room building with a seismic joint gap of 100 mm, was retrofitted in 2009 by three steel-braced frames in a longitudinal direction at the first story. The residual seismic capacity of the building after the earthquake was estimated to be 0.96 times the original lateral-load carrying capacity for the first story in a longitudinal direction. A damage level of the building was regarded as slight on the basis of this observation. Damages like cracks and spall-off of cover concrete were observed to 23 percent of piles among 130 piles which were inspected by an excavation survey. Inclination and settlement of the foundation of the special class-room building did not occur. Damaged piles were repaired to use the building successively.

Non-linear seismic response analysis was carried out, using general-purpose computer software called SNAP, to a three-dimensional frame model of the special class-room building to know about seismic behavior of the building. An earthquake motion in the east-west direction at the ground surface on a site of the school was deduced from the equivalent

linear analysis to take the magnification to an earthquake motion due to a surface layer of soil into account. An acceleration record measured at 112 meters below the ground at KiK-net Haga Observatory located 3 km away from the school was input to the engineering bed-rock surface for the analysis. An acceleration time-history record obtained as mentioned-above was input to the building in a longitudinal direction for the analysis.

A peak story drift angle taken by the seismic response analysis was 0.10 % for the first story and 0.08 % for the second story, which can explain actual slight damage to the building. A first-story column located one span away from a steel-braced frame failed in shear for the analysis, corresponding to the actual shear cracks classified as a damage grade of 3. In contrast, A peak story drift angle for the three-story class-room building, which was 0.38 %, 0.48 % and 0.57 % for the first, second and third story respectively, was at least four times that for the two-story special class-room building. The two-story building possessed a lateral load-carrying capacity 1.12 times greater than that of the three-story building. This is one reason why the damage level to these two buildings was different from each other.

Manabu YOSHIMURA

The effect of transverse walls on the seismic performance of RC columns was studied.

The strength, deformability and ductility index were compared for cases with and without transverse walls. The major findings from the studies that were done for columns with shear and flexure modes are as follows.

1. The transverse walls contributed to increasing strength; in average, 1.08 times for the shear mode and 1.16 times for the flexure mode.
2. The transverse walls contributed to increasing drift at collapse; 1.09 to 4.09 times for the shear mode and 2.63 times for the flexure mode.
3. By the dynamic analysis using the models representing columns with and without transverse walls, the ductility index was compared.

It was found out that for cases with transverse walls the ductility index could be increased 0.1 to 0.3 for the shear mode and 0.4 for the flexure mode than for cases without these walls.

Noriko TAKIYAMA

1. Explication on Static Behavior of Frames with Uneven Large Section Beams of Traditional Wooden Structure

Noriko TAKIYAMA

We research on understanding the seismic performance of frames with uneven large section beams and clarify the influence of the height of beams and the shape of fitting type joints on the behavior of the frame. In this study, we conducted a cyclic loading test for four test frames with spans of one or two and investigated the seismic performance and failure behavior. Moreover, analysis model was constructed by beam elements and compressive springs, and the initial stiffness is simulated by linear analysis.

2. Performance Confirmation Test on Timber Column-Ground Sill Joint Reinforced by Aramid Fiber Sheet

Noriko TAKIYAMA

This is the experimental study to understand the seismic performance of the timber column-ground sill joint reinforced by Aramid Fiber Sheet. The Aramid Fiber Sheet is weaved aramid fiber in one direction or bidirectional. Then, we conducted the bending test under cyclic loading for T-shaped joint specimens constructed by column and ground sill, to understand about seismic performance and failure behavior. Here, we try three types of sheet sticking method on timber: two usual methods and one our proposal method. Major findings can be summarized as: (a) When injured joint is reinforced by Aramid Fiber Sheet, initial stiffness is improvement, and the restoring force is raised depending on sheet

sticking method. (b) On the joint reinforced by the sheet, the deterioration of restoring force is occurred rather by peeling off the sheet than by fracture of the sheet.

3. Strength Test of Mortar Mixed Cellulose Nanofiber to Develop Joint Replacement Method of Brick Wall

Noriko TAKIYAMA

Recently, there are some advanced materials and the one is cellulose nanofiber. In past study, bending tests were conducted on masonry wall specimens reinforced by joint replacement cellulose nanofiber as intramural reinforcement to clarify the relationship between the changes of stiffness raising rate. Then, in this year, we made the some mortar test pieces had various mixture ratios of cellulose nanofiber, and conducted some material test on the test pieces.

4. Present State Analysis for Renovating Facilities in Densely Built-up Wooden House Areas

Noriko TAKIYAMA, Ryo SANUKI, Masumi MATSUMOTO, Tomoyuki GONDO and Shigeru AOKI

We research on buildings and their surroundings for disaster prevention in Chuo-3, Ota City, one of the areas in Tokyo, Japan that is Densely Built-up Wooden House Areas in Tokyo, Japan. We conducted an exhaustive survey of 383 buildings and roads in the northwest area of Chuo-3 in the last year. The buildings and their surroundings were considered. Next, we conducted microtremor measurements on the ground in the area. In this year, we summarized the outcomes of the review.

Kazushige YAMAMURA

Stochastic Analyses of Live Loads

YAMAMURA Kazushige

"Guidebook of Recommendation for Loads on Buildings" was co-written and published.

Kiwoong JIN

1. Seismic Performance and Different Limit States for Prestressed Reinforced Concrete Cruciform Beam-Column-Slab Subassemblage Forming Beam Yield Mechanism

JIN Kiwoong and KITAYAMA Kazuhiro

An ultimate objective of this study is to propose estimation method which can evaluate easily deformation capacity at different limit states with good accuracy for prestressed reinforced concrete (PRC) flexural beams, eventually aiming to formulate a performance-based seismic design methodology for PRC buildings.

Actual buildings have both slabs and transverse beams. Therefore, three beam-column-slab subassemblage specimens with transverse beams were tested in 2014 under cyclic load reversals to investigate hysteretic characteristics and the process of damage for PRC beams with slabs. A surface deformation along post-tensioning tendons, i.e., a plain bar or a deformed bar, and a contribution ratio of post-tensioning tendons to ultimate bending capacity for a PRC beam section (hereafter called a PT-ratio) were varied for specimens.

All specimens failed in beam flexure. Lateral force capacity attained to the peak for all specimens at or after yielding of post-tensioning tendons, after beam longitudinal bars yielded in tests. Concrete crushing at beam ends and buckling of longitudinal bars occurred for a beam using post-tensioning plain tendons. Crack patterns in slabs were almost same for subassemblage specimens with plain or deformed beam tendons regardless of poor or good bond along post-tensioning tendons. Following findings were obtained from the study.

(1) Regardless of a PT-ratio and bond conditions along post-tensioning tendons, the effective width of a slab on beam flexural capacity attained to 0.1 times the beam span length, which is provided by the AIJ Standard for Structural Calculation of R/C Structures, before a beam deflection angle of 0.3%, and reached 0.2 times the span length of the beam

before lateral force capacity attained to the peak.

(2) When a PT-ratio was set to be approximately 0.4 or 0.8 under top or bottom tension of a T-shaped section respectively, a maximum ratio of a residual deflection to a peak deflection for the beam became greater than 0.5 or less than 0.1 respectively, exhibiting remarkable difference in a residual deflection. Even if slabs are placed to a beam top, damage level, a residual deflection, a residual crack width and equivalent viscous damping ratio for a T-shaped-section beam were almost same under top and bottom tension of the beam, when both PT-ratios are set to be greater than 0.5 under top and bottom tension.

(3) Bond along a deformed post-tensioning tendon, which was good comparing with that along a plain tendon, deteriorated due to strain concentration at a beam critical section before lateral force capacity attained to the peak. Transverse beams enhanced the bond capacity along beam longitudinal bars within a beam-column joint due to those confining effect to a joint panel.

(4) A residual deflection and a residual crack width of a PRC beam grew large with good bond along tendons and longitudinal bars when post-tensioning tendons yielded prior to beam longitudinal bars. The greater a PT-ratio was set to be, the more remarkably this tendency was observed.

(5) A residual deflection, a residual crack width and equivalent viscous damping ratio for a PRC beam predicted by “Guidelines for Structural Design and Construction of Prestressed Concrete Buildings Based on Performance Evaluation Concept (Draft)” agreed approximately with test results. However, more studies are needed to improve the accuracy.

(6) A point on a skeleton curve in force-deflection relationship for a PRC beam corresponding to a first restorable limit state determined by elastic limitation or yielding of post-tensioning tendons coincided almost with a point where abrupt decline of a stiffness occurred. Points corresponding to a second restorable or safety limit state determined by core concrete crushing coincided almost with a point where load-carrying capacity decreased. A safety limit state for a T-shaped-section beam under top tension was attained due to concrete crushing at a bottom of the beam end.

2. Evaluation of Ultimate Flexural Strength and Deformation for Beams in Unbonded Precast Prestressed Concrete Cruciform Unit Frame

JIN Kiwoong and KITAYAMA Kazuhiro

In the precast prestressed concrete frame assembled by post-tensioning unbonded tendons with ungrouted sheaths, called an unbonded PCaPC frame, the beam rotates against the column face as a rigid body, causing remarkable opening at a connecting interface between a precast concrete column and a beam with scarce residual deformation. This can be achieved by the post-tensioning unbonded tendon, since its tensile strain is kept constant over the whole length. The unbonded PCaPC frame is designed as a strong column-weak beam system, so an accurate and simplified evaluation method for the ultimate flexural strength and deformation of the beam is necessary to mitigate earthquake damage. Attempts to estimate these values were carried out in previous studies. However, most studies dealt with an isolated beam removed from a moment-resisting frame, which cannot well reflect the precise seismic behavior of actual frames. In addition, they also requires a complicated mathematical calculation.

In this study, therefore, a macro-model, which can reproduce the flexural behavior of the cruciform unbonded PCaPC subassemblage, is proposed to evaluate the ultimate flexural strength and deflection of the beam, whose unbonded tendons are placed symmetrically at the top and the bottom in the beam section. An accurate and simplified estimation method for the ultimate flexural strength and deflection is then proposed based on the macro-model. These values predicted by the method are finally compared with previous experimental results to verify its validity. The proposed macro-model and general findings taken from this study can be summarized as follows.

(1) In the macro-model, after an opening occurs at the beam-column interface due to bending moment, the beam rotates as a rigid body. Beam axial deformation resulting from compressive strain, which develops at the extreme compression fiber along the entire length of the beam, is supposed to concentrate on the beam end. Concrete on the compressive side of a

beam is shortened at a tendon position, and the opening at the beam-column interface contributes primarily to elongation of the beam at a tendon position on the tensile side.

(2) The evaluation formula for the ultimate flexural strength and deflection of a beam was proposed based on the plane section assumption at the beam end and the following conditions; the sum of axial deformation attributed to both the concrete shortening and the opening distance at the beam-column interface at the tendon position in a cruciform subassembly is equal to the total elongation of the tendon, and the tensile and compressive resultant force in a beam section is the same.

(3) In the evaluation formula, the distance from extreme compression fiber to neutral axis in a beam section at the beam flexural strength, defined as x_n , is a crucial factor to calculate the beam strength and deflection. To obtain x_n , therefore, both an iterative method and a simplified manner were introduced.

(4) Predicted ultimate flexural strength and deflection of a beam by the proposed method showed a good agreement with the previous experimental results. The discrepancy between the calculated and observed ultimate flexural strength remained in a range of $\pm 10\%$, and that of the ultimate beam deflection remained within $\pm 15\%$.

(5) Since the distance x_n , obtained from the simplified manner aforementioned, tended to be slightly greater than that from the iterative method, the ultimate flexural strength and deflection of a beam by the simplified manner were found to be somewhat smaller than those by the iterative method. However, their discrepancy remained in a range of $\pm 5\%$ for both the ultimate flexural strength and deflection when the prestressing ratio of a tendon to its yield strength is greater than 0.6, which is generally accepted in an actual construction.

3. Earthquake Resistant Performance for Precast Prestressed Concrete Moment-Resisting Frame Assembled by Post-Tensioning Unbonded Tendons

JIN Kiwoong, KITAYAMA Kazuhiro and KANEMOTO Kiyomi (Shimz Corporation)

A beam-column joint hinging failure, which was proposed by Shiohara, has been broadly known for reinforced concrete (R/C) moment-resisting frames when an ultimate flexural capacity of a column section is close to that of a beam section in a R/C frame at the center of a beam-column joint. In contrast, for moment-resisting frames which consist of precast concrete beams and columns connected by post-tensioning unbonded tendons (called as a PCaPC frame), the joint-hinging failure is not verified through laboratory tests.

Therefore, in order to study on a failure mechanism of a beam-column joint in PCaPC frames, four interior beam-column subassembly specimens were tested under cyclic load reversals in 2014. Two plane specimens with a column-to-beam ultimate flexural capacity ratio of 1.3 or 2.1, one specimen with slabs alone and the other with both slabs and transverse beams having a column-to-beam ultimate flexural capacity ratio of 1.2 were used for tests. Column axial load of 800 kN (axial stress ratio of 0.15) was common. A joint shear capacity margin ranged from 1.3 to 1.5.

Conclusions drawn from the tests are summarized as follows.

(1) A column-to-beam ultimate flexural capacity ratio did not govern seismic behavior such as relationship between story shear force and story drift for plane interior beam-column subassembly specimens since these specimens did not fail in joint-hinging but beam flexure caused by concrete crushing at beam ends.

(2) Although a column-to-beam ultimate flexural capacity ratio was 1.2 for a subassembly specimen with slabs alone, the specimen did not fail in joint-hinging but beam flexure. In contrast, a joint panel rotation increased after peak lateral capacity and symptoms of joint-hinging failure were observed.

(3) Damage to a beam-column joint in a 3D subassembly specimen was mitigated due to slabs and transverse beams covering a joint panel surface, showing beam flexural failure in spite of a column-to-beam ultimate flexural capacity ratio of 1.2.

(4) Shear distortion and rotation occurred simultaneously in a joint panel even if damage to a beam-column joint was slight.

(5) The effective width of a slab on beam flexural capacity exceeded 0.1 times the beam span length before a beam deflection angle of 0.3%, and reached 0.2 times the beam span length at a beam deflection angle of approximately 0.6%.

4. Flexural Behavior for Beams in Precast Prestressed Concrete Beam-Column Frame Assembled by Post-Tensioning Unbonded Tendons

JIN Kiwoong and KITAYAMA Kazuhiro

A final objective of this study is to propose an easy and explicit method which can evaluate both strength and deformation capacity at different limit states such as a yield and ultimate point for beams in a precast prestressed concrete frame assembled by post-tensioning unbonded tendons (called unbonded PCaPC), eventually aiming to establish a performance-based seismic design methodology for unbonded PCaPC buildings. Some loading tests have been conducted for unbonded PCaPC interior and exterior beam-column subassemblages in our laboratory to accumulate significant test data.

In the study, unbonded PCaPC cruciform beam-column subassemblages, which were designed to develop beam flexural yielding, were tested under cyclic load reversals to investigate those mechanical behavior and a failure process. A ratio of total tensile force induced to post-tensioning unbonded tendons to the product of a beam sectional area and concrete compressive strength (called a PC-steel ratio) was varied in the test.

Two plane specimens and a 3D specimen with slabs and no-loaded transverse beams were tested. A PC-steel ratio of beams was 0.09 and 0.17 for two plane specimens, and 0.09 for the 3D specimen. A column-to-beam capacity ratio of 2.3 and 2.6 was set by adjusting the amount of column longitudinal reinforcement respectively for plane specimens, and 1.9 for the 3D specimen. This was intended to prevent joint-hinging failure of a beam-column joint panel. Concrete compressive strength was 40 N/mm².

All specimens failed in concrete crushing at beam ends, showing an origin-oriented shape of hysteresis loops. Column longitudinal bars did not yield for all specimens. Lateral load-carrying capacity for a plane specimen with a PC-steel ratio of 0.09 reached the peak with concrete crushing at beam ends after strain of post-tensioning tendons exceeded the elastic limitation. Post-tensioning tendons yielded after the peak capacity for the specimen. Lateral load-carrying capacity for a plane specimen with a PC-steel ratio of 0.17 and a 3D specimen reached the peak when attaining to elastic limitation strain of tendons, after joint lateral hoops yielded and crushing occurred in cover concrete at beam ends. Effective width of a slab on the beam bending moment capacity increased with deformation of the beam, eventually developing yielding for almost all slab longitudinal bars at a story drift angle of 3 %.

ENVIRONMENTAL ENGINEERING

Nobuyuki SUNAGA

Research on Comfortable Bioclimatic Architecture

For the benefit of preserving global environment, the effective use of energy consumed in architecture and the utilization of natural energy are indispensable factors for architectural design. Furthermore to popularize Zero Energy Building and Bioclimatic Architecture (BA) which is designed by considering energy conservation, natural energy utilization and comfortable environment, it is necessary to clarify the actual performance of BA and to establish evaluation methods which are simple and widely acceptable for the public. We have been engaged in the research of these themes, and, in recent years, we give high priority to improve building stocks.

In this academic year (2015/04 – 2016/03), we mainly carried out following studies and activities.

1. Effect of Home Energy Management System (HEMS) and Energy Saving Action

We have been studying the effect of HEMS on the energy conservation in detached houses with PV system by filed measurement and questionnaire survey, collaborating with Sekisui Chemical Co., Ltd. from 2010. In this academic year, we carried out the analysis on the monitoring data of indoor thermal environment in 75 residents, and examined about the energy saving potential by the change of Life-Style in High-Performance Detached Houses.

2. Long-life, Environmental Friendly House by Tokyo Metropolitan Government [Collaboration with Assistant Professor Eiko Kumakura]

We are studying about the performance of 16 detached houses which have high thermal performance, a solar floor heating and hot water system and HEMS from 2013. And also we are examining the outside thermal environment in this site which has much green and a soil pass way in the center. In this academic year we clarified that the energy consumption of these houses has no summer peak by solar hot water system and is about half of ordinary houses in this area. And then, the carbon dioxide emission of these houses is about 25 % of the ordinary houses by considering the sold electricity of solar power generation.

3. Relationship between Thermal Insulation Performance and Life Quality

When the thermal insulation performance of residence leaps to the highest level, it is considered the comfortableness of residents is improved and the residents' behavior and awareness will be changed. This research examines the effect of high level thermal insulation by actual measurement, questionnaire survey and Web survey, collaborating with Asahi Kasei Construction Materials Corporation. In this academic year, it is shown the higher thermal insulation residences have most residents' satisfaction and small temperature difference among rooms and so on.

4. Research on Energy-Saving Renovation of Existing Detached house

In this academic year we surveyed the support-measures for energy-saving renovation by government and examined the effect of thermal environment improvement using the government' s supports. We showed there are four incentives for consumer to improve the thermal performance of houses and most national undertakings and institutions for renewal of residential building started from 2008.

5. Improvement of Thermal Performance of Apartment House in Asia [Collaboration with Assistant Professor Eiko Kumakura]

We carried out the literature survey about the thermal performance of apartment house and clarified that there are small number of study about it, especially in summer, in Japan and China. So we started the indoor climate

measurement and the questionnaire survey for apartment house in Asia from 2014. In this academic year we surveyed at Naha city, Okinawa prefecture, in Japanese climate zone XIII (in subtropics), and read a paper of the analysis results about apartments in Tokyo, Kumamoto (in Japan), Hangzhou and Qingdao (in China) at the PLEA 2015 conference.

6. Active Energy-Saving Control System for Air-conditioning Utilizing Adjustment Behavior of Occupants

We are studying a new energy-saving control system for Air-conditioning. This system is able to install to the existing small and medium-sized building and to reduce the room conditioning deterioration by energy-saving action. This system is characterized by sensing occupants' on/off operation onto the air-conditioning. We monitored an office in mid-size building in Tokyo throughout 2 years. In this year, we clarified the marvelous performance of this system and the necessity to control the all indoor units one by one.

7. Effect of Ceiling Radiant Cooling System with Dehumidification Function [Collaboration with Assistant Professor Nobutaka Fukudome]

Our laboratory and Aoki Home-Services Co., Ltd. developed this system about 10 years ago. Last two years we examined the performance of this system in a library of university in Tokyo, designed by Nihon-sekkei Co., Ltd., by monitoring changing its operation ways. From the results we discussed the appropriate operation method of this system. This system is awarded the GOOD DESIGN AWARD 2015 in Japan and the Environmental Design Award of 2014 of Association of Building Engineering and Equipment.

8. Cross-ventilation Effect of Outward Window

We are studying about the cross-ventilation effect of an outward window, developed by LIXIL Co., Ltd., that consists of the upper opening and the lower opening and each opening open to the opposite direction. It is shown this window has good cross-ventilation effect in the one-side opening room from experiments in 2014. In this year we carried out simulation analysis, using STREAM, about the difference of wind direction and so on.

9. Other outcome, social contribution and award

- 1) N. Sunaga acted Head of the Architecture and Building Engineering Course and the Graduate School of Architecture and Building Engineering.
- 2) N. Sunaga is working by the director of Japan Solar Energy Society, and also played as the chairman of Solar Architectural section, and so on.
- 3) N. Sunaga et al. got the GOOD DESIGN AWARD 2015 by the Ceiling Cooling System, developed by the Aoki Home-Services Co., Ltd., Nihon-Sekkei Co., Ltd. and Sunaga Laboratory. And we also got the Environmental Design Award 2014 of Association of Building Engineering and Equipment.
- 4) Three master course students, Mr. Shuhei Masui, Mr. Keisuke Ogura and Miss Fu Nakajima, received Student Encouragement Prize of Japan Solar Energy Society.
- 5) A master course student, Mr. Ikuya Nakano, received Student Encouragement Prize of Architectural Institute of Japan.
- 6) An under-graduate student, Mr. Ryo Meshino, received Graduation Thesis Prize of the Society of Heating, Air-Conditioning and Sanitary Engineers of Japan.

Akihiro NAGATA

1. Experiment and Simulation of the effects of Chairs on the Thermal Sensation

Akihiro NAGATA

2. A Study on the Evaluation Method of Thermal Performance for Combination of Glazing and Shading Devices
Akihiro NAGATA

Eiko KUMAKURA

1. Developing a virtual reality spatial system of tsunami-stricken villages in Japan

Eiko Kumakura, Akinobu Murakami (Tsukuba University)

To develop a 3-D model of tsunami-stricken villages in the Tohoku area, images of the landscape should be connected with victims' memories of life there. To give victims a better understanding of their villages, we have developed a virtual reality spatial model with a walking experience—this year, in the city of Iwanuma. Next year, we plan to complete a similar project at a fishing village in Iwate.

2. Landscape design using thermal environmental simulation for passive residential district project in Japan

Eiko Kumakura, Akinobu Murakami (Tsukuba University) and Kazuaki Nakaohkubo (Saga University)

This research aimed to broaden the landscape design process by introducing a thermal environmental simulation tool. Last year, we used a previously implemented thermal simulation tool to evaluate the effects of tree shape, position, and ground materials on the outdoor thermal environment in the early landscape design process. This year, we explored other approaches to using the simulator at a practical level. As a result, we found that simulation can be used to create guidelines for landscape design that consider thermal comfort.

3. Relationships between common garden path design and thermal environment in the summer

Eiko Kumakura, Nobuyuki Sunaga

This study investigated the potential of creating cool areas through resident behaviors—for example, plant watering—related to properties of the outdoor environment in a district of detached houses with a common garden path. Last year, we discovered that watering the whole site could reduce the average air temperature throughout the common path by 0.8 °C, as observed by comparing temperatures before and after watering. This year, we found that residents who came to appreciate the space provided by the common path tended to notice tree growth and comfortable breezes in the morning and evening, even in midsummer, as achieved by opening windows. These findings suggest that the positional relation of houses and common garden paths can affect the lifestyles of residents, as reflected by behaviors such as opening windows and noticing the growth of vegetation.

4. Thermal environment of pedestrian areas along the marathon course at the 2020 Tokyo Olympics

Eiko Kumakura and Nobuyuki Sunaga

In preparation for the 2020 Tokyo Olympics, the Japanese government and developers seek to create cool areas by using highly-reflective paint, roadside trees, and water-retentive pavement. However, such techniques are regularly introduced to urban areas despite their various impacts, which depend on the radiant environment at any given time and place. In response, this study aimed to reveal the thermal environment along the marathon course for the 2020 Olympics, chiefly by taking moving measurements via bicycle on sunny days in August and September 2015 between 8 and 11 am. We found that roads along a large park were the warmest of the entire course, for they received both direct and reflected solar radiation from their surroundings. Roads in the NNW–SSE direction forming a street canyon tended to be hot because the sun came from a similar direction in the morning, whereas the temperature along roads going NNE–SSW was influenced by various shading sources, including roadside trees and rooftop advertising displays. We therefore propose an improvement plan using shading construction and trees based on road direction and data from a thermal simulation tool in the next year.

5. Ultraviolet radiation on Asian streets with skyscrapers

Eiko Kumakura and Masayuki Ichinose

High reflection glass (e.g., low-emissivity glass) has been used in the façades of many skyscrapers recently constructed in urban areas in order to reduce their energy consumption. However, some of that glass reflects not only near infrared radiation but also visible and ultraviolet radiation (UVR). In this study, we measured the UVR environment of high-rise building areas in Tokyo and Singapore. Among other results, UVR increased along with the sky view factor (SVF), though some small D/H districts with less SVF showed greater UVR values due to reflection from nearby building façades. Directional UVR was weak where directional visible radiation was strong, thereby suggesting that UVR diffuseness is stronger than visible radiation. Therefore, to protect against UVR in street canyons, it is important to promote shade from every side using vegetation such as tree crowns, glass, and wall greening.

Rumiko SASAKI

1. Latest technology adoption of medical institute in urban area, focusing on construction process in Thailand

Rumiko SASAKI

This research conducts interview to building production stakeholder regarding adoption of latest technology such as building standard and material.

LIST OF RESEARCH ACTIVITIES

ARCHITECTURAL PLANNING/ CITY PLANNING

Kenji TAKEMIYA

1. Refereed Papers

- 1) NISHISAKA Naoko , TAKEMIYA Kenji: CHARACTERISTICS OF UTILIZATION OF A COUNSELING AND SUPPORT CENTER IN A SUPER-AGING HOUSING FACILITY OUTSIDE A HOSPITAL: A CASE STUDY OF K CENTER, AIJ Journal of Technology and Design, 22(50), pp.225-230, 2016 (in Japanese)

2. Proceedings of Oral Presentations

- 1) Bui Thi Thu Ha , TAKEMIYA Kenji: Study on the facility management and planning of international house Case study of the private universities in Tokyo, Summaries of technical papers of annual meeting E-1, AIJ, pp.285-286, 2015-09-04 (in Japanese)
- 2) KAMITOMO Yoki , TAKEMIYA Kenji: Study on the management and utilization of Hospital Hospitality House : Case study on the facility providing childcare of children whose sibilings are receiving treatment, Summaries of technical papers of annual meeting E-1, AIJ, pp.169-170, 2015-09-04 (in Japanese)
- 3) TAKEMIYA Kenji , AOKI Sakurako , ISHIBASHI Tatsuo , KOBAYASHI Kenichi: Medical equipment management and family support environment in neonatal intensive care wards : Study on management and planning of the neonatal intensive care wards for advanced perinatal care Part 2, Summaries of technical papers of annual meeting E-1, AIJ, pp.163-164, 2015-09-04 (in Japanese)
- 4) AOKI Sakurako , TAKEMIYA Kenji , ISHIBASHI Tatsuo , KOBAYASHI Kenichi: Management system and facility planning of the neonatal intensive care wards : Study on management and planning of the neonatal intensive care wards for advanced perinatal care Part 1, Summaries of technical papers of annual meeting E-1, AIJ, pp.161-162, 2015-09-04 (in Japanese)
- 5) SEKINE Chisano , KIM Sungryong , TAKEMIYA Kenji: Actual management and usage of "Gyonrodan" in Seoul : A study on planning of pastime and support facilities for healthy elderly people Part 4, Summaries of technical papers of annual meeting E-1, AIJ, pp.47-48, 2015-09-04 (in Japanese)
- 6) JEON Yong-II, SEKINE Chisano , KIM Sungryong , TAKEMIYA Kenji: Actual development status of facilities for healthy elderly in Tokyo : A study on planning of pastime and support facilities for healthy elderly people Part 3, Summaries of technical papers of annual meeting E-1, AIJ, pp.45-46, 2015-09-04 (in Japanese)
- 7) YAMADA Yuko , TAKEMIYA Kenji: A Study on the facility management and actual usage of health and social care centers for the elderly in T city, Summaries of technical papers of annual meeting E-1, AIJ, pp.21-22, 2015-09-04 (in Japanese)
- 8) KAWATA Yuki , TAKEMIYA Kenji: Study on the facility planning and management of small scale multifunctional care facilities : Case study of the facilities which put dwelling facilities adjacently in 23 wards in Tokyo, Summaries of technical papers of annual meeting E-1, AIJ, pp.15-16, 2015-09-04 (in Japanese)
- 9) KIM Sungryong , TAKEMIYA Kenji: Analysis of the developmental process of small multifunctional care facilities for the elderly : Case study on five pioneering facilities, Summaries of technical papers of annual meeting E-1, AIJ, pp.13-14, 2015-09-04 (in Japanese)

Tohru YOSHIKAWA

1. Refereed Articles

- 1) KOJO Takuro, YOSHIKAWA Tohru and SANUKI Ryo, Analysis of Intraurban Accessibility Focusing on the Reorganization of Transportation Network Systems, *Journal of the City Planning Institute of Japan*, Vol. 50, No.3, pp.309-316, (Oct. 2015), (in Japanese)
- 2) Tatsuya Suzuki, Tohru Yoshikawa and Ryo Sanuki, Formulation of a Quantitative Method to Evaluate the Accessibility to Food Facilities Based on the Load of the Facility Utilization for Analysis of Population Distribution, *Journal of Asian Architecture and Building Engineering*, Vol.14, No.2, pp.355-362, (May. 2015)

2. Proceedings of Oral Presentations

- 1) MUNEMURA Ryo, YOSHIKAWA Tohru and SANUKI Ryo, Analysis on Difficulty in Route Search in Station Space by Comparison with the Indexes Concerning Number of Routes, *Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan*, E-1, pp. 445-446, (Sep. 2015), (in Japanese)
- 2) LIAO Yuchia, CUI Xueqi, TSUNODA Makoto, YOSHIKAWA Tohru, Research on Housing Regeneration Process of Reaching Household Consensus in Taipei, *Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan*, F-2, pp.315-316, (Sep. 2015), (in Japanese)
- 3) CUI Xueqi, LIAO Yuchia, TSUNODA Makoto, YOSHIKAWA Tohru, YI Sangjun, SANUKI Ryo, Research on Housing Regeneration Process of Reaching Household Consensus in Taipei, *Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan*, F-2, pp.317-318, (Sep. 2015), (in Japanese)
- 4) IRIE Haruno, Yoshikawa Tohru and SANUKI Ryo, Spatial Composition of Shopping Centers Easy to Walk in Search - A Case Study on Lazona Kawasaki Plaza and Bono Sagamiono -, *Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan*, E-1, pp.451-452, (Sep. 2015), (in Japanese)
- 5) KOJO Takuro, YOSHIKAWA Tohru, SANUKI Ryo, Analysis of Urban Accessibility Focusing on the Difference in Systems on the Transportation Network - Comparison between through and Hierarchical Types -, *Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan*, F-2, pp.55-56, (Sep. 2015), (in Japanese)
- 6) AIYOSHI Kozue, YOSHIKAWA Tohru, SANUKI Ryo, Analysis on the Change in Commercial Clusters of Urban Redevelopment Areas and their Neighborhoods Focusing on Mutual Acclimation and Penetration, *Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan*, F-2, pp.89-90, (Sep. 2015), (in Japanese)
- 7) MACHINAGA Ryo, YOSHIKAWA Tohru and SANUKI Ryo, Location Optimization of Smoking Areas as NIMBY Facilities, *Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan*, F-2, pp.803-804, (Sep. 2015), (in Japanese)
- 8) ISHII Kentaro, YOSHIKAWA Tohru and SANUKI Ryo, Analysis of the relationship between recognition of the names of streets and rents as well as land prices, *Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan*, F-2, pp.839-840, (Sep. 2015), (in Japanese)
- 9) SANUKI Ryo, SATOH Eiji and YOSHIKAWA Tohru, Analysis of the Modifiable Areal Unit Problem by Comparing Road Distances of Building Points as well as Small Areas and Basic Unit Blocks of National Census - Focusing on the Accessibility to Medical Services in Akita Prefecture -, *Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan*, F-2, pp.989-990, (Sep. 2015), (in Japanese)
- 10) ISOBE Takayuki and YOSHIKAWA Tohru, Survey on the Actual Situation and Analysis of Utilization Scenarios for the Appropriate Placements of ARDs in Large-scale Urban Facilities -Basic Study on Urban Facilities for Security and Relief in Cities, Part 4, *Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan*, F-2, pp.991-992, (Sep. 2015), (in Japanese)
- 11) SUZUKI Tatsuya and YOSHIKAWA Tohru, Analysis on the Optimum Arrangement of Regional Core Facilities Focused on the Compactness and Population Agglomeration Based on the Travel Distance between Sites,

- Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, F-2, pp.993-994, (Sep. 2015), (in Japanese)
- 12) LE Phong Nguyen, YOSHIKAWA Tohru, Basic Study on Traveling Time by Urban Public Transport, Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, F-2, pp.995-996, (Sep. 2015), (in Japanese)
 - 13) ADACHI Takuya, YOSHIKAWA Tohru, Theoretical study of urban space configuration easy to dropping in focusing on placement of workplace and entertainment facilities as well as home, Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, F-2, pp.997-998, (Sep. 2015), (in Japanese)
 - 14) YOSHIKAWA Tohru, Comparative analysis of evaluation indexes of regional public buildings considering the influence of removal focusing on distance decay of the utilization ratio, Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, F-2, 999-1000, (Sep. 2015), (in Japanese)
 - 15) Tatsuya Suzuki, Tohru Yoshikawa and Ryo Sanuki, Analysis of the Relationship between the Residential Distribution of the Elderly and the Accessibility to food Facilities in terms of Energy Load: A Case Study in Hachioji City in the Suburbs of Tokyo, International Conference 2015 on Spatial Planning and Sustainable Development, Aug. 7-9, 2015, TAIPEI, No. 106, (Aug. 2015),

3. Others

3-2 Research Reports

- 1) Kentaro Ishii, Tohru Yoshikawa and Ryo Sanuki, Analysis of the relationship between recognition of the names of streets and rents as well as land prices based on the correlation with the numbers of pedestrians, Reports of the City Planning Institute of Japan, No.14, pp.27-32, (June. 2015), (in Japanese)
- 2) Kozue Aiyoshi, Ryo Sanuki, Tohru Yoshikawa, Analysis on the Change in Commercial Clusters of Urban Redevelopment Areas for Commercial complexes and their Neighborhoods Focusing on Mutual Acclimation and Penetration, Reports of the City Planning Institute of Japan, No.14, pp.33-38, (June. 2015), (in Japanese)
- 3) Takuya Adachi and Tohru Yoshikawa, Analysis of urban space constitution easy to dropping in focusing on placement of workplace and entertainment facilities and home, Reports of the City Planning Institute of Japan, No.14, pp.39-44, (June. 2015), (in Japanese)

3-3 Manuals / Reviews

- 1) YOSHIKAWA Tohru, Recall of the Memory, Revival of the Town, Studies on Tama New Town, No.17, p.3, (April. 2015), (in Japanese)
- 2) YOSHIKAWA Tohru, Great Plans as Likes and Dislikes, Studies on Tama New Town, No.17, pp.157-158, (April. 2015), (in Japanese)

Masumi MATSUMOTO

1. Refereed Papers

- 1) N. Takiyama, K. Hara, R. Sanuki, M. Matsumoto, T. Gondo and S. Aoki, An Exhaustive Survey for Renovating Facilities in Densely Built-up Wooden House Areas, Proceeding of the Eighth International Structural Engineering and Construction Conference, Sydney, Australia, pp.321-326, 2015.11.

2. Proceedings of Oral Presentations

- 1) MOTEGI Yayoiko and MATSUMOTO Masumi, Interview research on housing interior for architects from thirties to fifties, Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, F-1, pp. 217-218,

2015.9.(in Japanese)

- 2) MOTEGI Yayoiko and MATSUMOTO Masumi, Interview Research on Housing Interior to Architects 50 years or older, Summaries of the 27th Annual Conference of Japan Society for Interior Studies, pp.25-26, 2015.10. (in Japanese)

3-3. Manuals / Reviews

- 1) Matsumoto Masumi, Managing of Public and Semi Public Housing in New Town, Studies on Tama Newtown, No.17, 2015.4.30 (in Japanese)

ARCHITECTURAL DESIGN AND HISTORY

Masao KOIZUMI

1. Refereed Papers

- 1) Masao KOIZUMI, The 9th Awards of Architectural Designs in Kyusyu, Toyono Elementary School and Junior High School, 2015.7

2. Proceedings of Oral Presentations

- 1) Masao KOIZUMI and others, Exhibition “Shanghai Urban Space Art Season”; Shanghai Sculpture Committee, 2015.6 (in English)
- 2) Masao KOIZUMI and others, Exhibition “City Living-BankART1929s Activities”; BankART1929, 2015.11 (in English)

3-2. Research Reports

- 1) Masao KOIZUMI, Lecture “Ululu meeting”, Kikushima, 2015.6
- 2) Masao KOIZUMI and others, Symposium “New Education Expo 2015”, New Education Expo Executive committee, 2014.6
- 3) Masao KOIZUMI, seminar “wood utilization, Japan wooden Housing Industry Association, 2015.6
- 4) Masao KOIZUMI and others, seminar “life style in summer”, Nomura Real Estate Development Co., Ltd., 2015.7
- 5) Masao KOIZUMI and others, Work Shop in BINUS University in Indonesia, 2015.9
- 6) Masao KOIZUMI, Lecture “Housing Planning and Environmental Design”, Kanagawa Housing & Community Development Association, 2015.10
- 7) Masao KOIZUMI, Lecture “BankART school- a biographies of architects in Yokohama”, BankART school, 2015.10
- 8) Masao KOIZUMI and others, Symposium “message about <The publicness> from the committees”, Daito Trust Construction, 2015.10
- 9) Masao KOIZUMI and others, Lecture “the life style for tomorrow @CC labo in Yokodai”, WG for the Style of Next generation , 2015.11
- 10) Masao KOIZUMI and others, Lecture “iEXPO 2015-city and innovation-”, NUA NEC , 2015.11
- 11) Masao KOIZUMI and others, Symposium “the creative city of Yokohama”, BankART1929, 2015.11
- 12) Masao KOIZUMI and others, panel discussion “Projects of the Sustainable residential area”, Daito Trust Construction, 2016.1
- 13) Masao KOIZUMI and others, panel discussion “utilization of city function in Odawara style”, JIA Kanagawa, 2016.2

3-3. Manuals/Reviews

- 1) Masao KOIZUMI, What is the BIPV? The building with solar energy “house as home electronics”, p.92, Tetsuado, 2015.7
- 2) Masao KOIZUMI and others, Financial Times House&Home “Natural born chillers”, pp.8-9, Financial Times, 2015.11
- 3) Masao KOIZUMI and others, the 4th Daito Trust Construction Rented Accommodation competition “message about <The publicness> from the committees”, pp.36-37, Shin kenchiku-sya, 2015.12
- 4) Masao KOIZUMI and others, lecture of wood utilization possibility of wooden architectural design, pp.55-72, Japan wooden Housing Industry Association, 2015.3

3-4. Works/Products, etc.

- 1) Masao KOIZUMI, ETB counter and wagon rack for ZOU-NO-HANA Terrace, 2015.6
- 2) Masao KOIZUMI and others, Exhibition “life style for tomorrow @CC labo in Yokodai”, WG for the Style of Next generation , 2015.11
- 3) Masao KOIZUMI and others, The 12th ECO-Products Awards - Chairperson's Award, Eco-Products Awards Steering Committee, Eco-Products Awards Steering Committee, 2015.11
- 4) Masao KOIZUMI and others, Exhibition “Works of Architects”, JIA Kanagawa, 2016.2
- 5) Masao KOIZUMI and others, The Awards of Building Material and Equipment - Special Award, Nikkei Architecture and Nikkei Home Builder, 2015.11
- 6) Masao KOIZUMI and others, Toyono Elementary School and Junior High School, Selected Architectural Designs in Kyusyu 2015, architectural and institute of Japan Kyusyu Chapter, 2016.3

Katsuhiro KOBAYASHI

1. Refereed Papers

- 1) Katsuhiro KOBAYASHI, Akira KINOSHITA, Sho KADONO, A Study on “Successions of Residential Character” in Case of Conversion-Comparative Analysis on Possibilities of Succeeding Residential character in Converted Example-, Journal of the Housing Research Foundation “Jyusoken” No.42 (in Japanese), pp.25-36, March 2016
- 2) N. Takiyama, F. Matsuno, T. Kumagai, N. Idate, K. Hara & K. Kobayashi, Conversion of Historic Masonry Constructions and Structural Characteristics of Walls by Intramural Reinforcement, "REHAB-Lab 2016 - 1st International Laboratory on Technologies and Practices for the Conservation, Maintenance and Rehabilitation of Historic Buildings", June 2015

2. Proceedings of Oral Presentations

- 1) KOBAYASHI Katsuhiro, Conversion for Activating Building Stocks”, a Invited Lecture at Taitou-word, 10 Feb.2016 (in Japanese)
- 2) KOBAYASHI Katsuhiro, Architectural Conversion in the World, 16 March 2016, at Dalian Institute of Technology
- 3) ENOMOTO Ai, KOBAYASHI Katsuhiro, Akira KINOSHITA, et al., Studies on Design of Recent Skyscrapers (Part 15), Tendencies and Major Works in South Korea (Seoul, Incheon and Busan), Summaries of Technical Papers of Annual Meeting, A.I.J., pp. 381-382, Sept. 2015 (in Japanese)
- 4) MIYAO Yuri, KOBAYASHI Katsuhiro, Akira KINOSHITA, et al., Studies on Design of Recent Skyscrapers (Part 16), Tendencies and Major Works in Indonesia, Summaries of Technical Papers of Annual Meeting, A.I.J., pp. 383-384, Sept. 2015 (in Japanese)
- 5) TACHIBANA Fuko, KOBAYASHI Katsuhiro, Akira KINOSHITA, et al., Studies on Design of Recent Skyscrapers (Part 17), Tendencies and Major Works in Istanbul, Summaries of Technical Papers of Annual Meeting, A.I.J., pp. 385-386, Sept. 2015 (in Japanese)
- 6) KOBAYASHI Katsuhiro, MIZUTANI Kei, et al., Studies on Design of Recent Skyscrapers (Part 18), Tendencies and Major Works in New York, Summaries of Technical Papers of Annual Meeting, A.I.J., pp. 387-388, Sept. 2015 (in Japanese)
- 7) NAGAHASHI Yuta, KOBAYASHI Katsuhiro, Akira KINOSHITA, et al., Studies on the Architectural Conversion in Canada, Part 1, Design Methods of Converted Examples in Montreal and Quebec City, Summaries of Technical Papers of Annual Meeting, A.I.J., pp. 401-402, Sept. 2015 (in Japanese)
- 8) KADONO Sho, KOBAYASHI Katsuhiro, Akira KINOSHITA, et al., Studies on the Architectural Conversion in

- Canada, Part 2, Design Methods in Examples in Toronto and Ottawa, Summaries of Technical Papers of Annual Meeting, A.I.J., pp. 403-404, Sept. 2015 (in Japanese)
- 9) TAKEDA Kanji, KOBAYASHI Katsuhiro, Akira KINOSHITA, et al., Studies on the Architectural Conversion in Canada, Part 3, Design Methods of Converted Examples in Vancouver, Summaries of Technical Papers of Annual Meeting, A.I.J., pp. 405-406, Sept. 2015 (in Japanese)
 - 10) KAYAHARA Shun, KOBAYASHI Katsuhiro, Akira KINOSHITA, et al., Studies on the Architectural Conversion in South Korea, Design Methods of Converted Examples in Seoul and Incheon, Summaries of Technical Papers of Annual Meeting, A.I.J., pp. 407-408, Sept. 2015 (in Japanese)
 - 11) TSUKADA Yuki, KOBAYASHI Katsuhiro, et al., Studies on the Architectural Conversion in Indonesia, Focusing on the Converted Building in Jakarta, Summaries of Technical Papers of Annual Meeting, A.I.J., pp. 409-410, Sept. 2015 (in Japanese)
 - 12) FUJIMOTO Yuta, KOBAYASHI Katsuhiro, et al., Studies on the Architectural Conversion in Poland, Part 1, Design Methods in Conversion from Industrial Facilities, Summaries of Technical Papers of Annual Meeting, A.I.J., pp. 411-412, Sept. 2015 (in Japanese)
 - 13) KUMAGAI Takeru, KOBAYASHI Katsuhiro, et al., Studies on the Architectural Conversion in Poland, Part 2, Design Methods in Conversion from Public, Commercial and Residential Facilities, Summaries of Technical Papers of Annual Meeting, A.I.J., pp. 413-414, Sept. 2015 (in Japanese)
 - 14) MORITA Kiyoka, KOBAYASHI Katsuhiro, et al., Studies on the Architectural Conversion in Czech Republic, Part 1, Design Methods in Conversion from Public, Commercial, and Industrial Facilities, Summaries of Technical Papers of Annual Meeting, A.I.J., pp. 415-416, Sept. 2015 (in Japanese)
 - 15) NAKAMURA Yuka, KOBAYASHI Katsuhiro, et al., Studies on the Architectural Conversion in Czech Republic, Part 2, Design Methods in Conversion from Residential Facilities and Offices in Prague, Summaries of Technical Papers of Annual Meeting, A.I.J., pp. 417-418, Sept. 2015 (in Japanese)
 - 16) KIMURA Akitoshi, KOBAYASHI Katsuhiro, et al., Studies on the Architectural Conversion in Wien, Recent Trend and Design Method in Converted Examples, Summaries of Technical Papers of Annual Meeting, A.I.J., pp. 419-420, Sept. 2015 (in Japanese)
 - 17) MIZUTANI Kei, KOBAYASHI Katsuhiro, et al., Studies on the Architectural Conversion in Hungary, Design Methods of Converted Examples in Budapest and Pecs, Summaries of Technical Papers of Annual Meeting, A.I.J., pp. 421-422, Sept. 2015 (in Japanese)
 - 18) KAWABATA Yukiko, KOBAYASHI Katsuhiro, et al., Studies on the Architectural Conversion in Romania, Design Methods of Converted Examples in Bucharest, Brasov and Turda, Summaries of Technical Papers of Annual Meeting, A.I.J., pp. 423-424, Sept. 2015 (in Japanese)
 - 19) HASHIMOTO Takuma, KOBAYASHI Katsuhiro, et al., Studies on the Architectural Conversion in Istanbul, An Analysis on Trend in Recent Years and Design Methods, Summaries of Technical Papers of Annual Meeting, A.I.J., pp. 425-426, Sept. 2015 (in Japanese)

3-1 Monographs / Technical books

- 1) KOBAYASHI Katsuhiro, KINOSHITA Akira, et al., Skyscrapers Challenge of Tall Buildings in the World, Kajima Institute Publishing Co., Ltd., Aug. 2015

3-2 Research Reports

- 1) KOBAYASHI Katsuhiro, KINOSHITA Akira, et al., Report of Survey on Architectural Conversion in Northern Italy, 200 pages, March 2016
- 2) KOBAYASHI Katsuhiro et al., Report of Survey on Architectural Conversion in India, 100 pages, March 2016

Yukimasa YAMADA

2. Proceedings of Oral Presentations

- 1) Yukimasa YAMADA: The Cultural Value of Timber-Framed Churches in Northern Vietnam 2015, ICOMOS Thailand International Conference 2015, Timber Heritage and Cultural Tourism: Values, Innovation and Visitor Management (CIAV+ICTC 2015), Bangkok, Thailand.
- 2) Mikako NAGAI, Yukimasa YAMADA and Monami MAEDA 2015, Interior Space Composition of Small-sized Churches in the Phatdiem Diocese, Part 1—Studies on Historical Catholic Churches in the Northern Vietnam (5)—, Summaries of Technical Papers of Annual Meeting, A.I.J., pp. 33-34 (in Japanese).
- 3) Yukimasa YAMADA, Mikako NAGAI and Monami MAEDA 2015, Interior Space Composition of Small-sized Churches in the Phatdiem Diocese, Part 2—Studies on Historical Catholic Churches in the Northern Vietnam (6)—, Summaries of Technical Papers of Annual Meeting, A.I.J., pp. 35-36 (in Japanese).
- 4) Monami MAEDA, Yukimasa YAMADA and Mikako NAGAI 2015, Façade Design of Small-sized Churches in the Phatdiem Diocese—Studies on Historical Catholic Churches in the Northern Vietnam (7)—, Summaries of Technical Papers of Annual Meeting, A.I.J., pp. 37-38 (in Japanese).
- 5) Li TAO and Yukimasa YAMADA 2015, Historical Changes of Mosques Management System in China, Summaries of Technical Papers of Annual Meeting, A.I.J., pp. 55-56 (in Japanese).
- 6) Yuya MIYAZAKI and Yukimasa YAMADA 2015, Primary Findings on Current Status of Registration System for Cultural Properties Based on a Nationwide Questionnaire Survey, Summaries of Technical Papers of Annual Meeting, A.I.J., pp. 857-858 (in Japanese).

Akira KINOSHITA

2. Proceedings of Oral Presentations

- 1) ENOMOTO Ai, KOBAYASHI Katsuhiko, Akira KINOSHITA, et al., Studies on Design of Recent Skyscrapers (Part 15), Tendencies and Major Works in South Korea (Seoul, Incheon and Busan), Summaries of Technical Papers of Annual Meeting, A.I.J., pp. 381-382, Sept. 2015 (in Japanese)
- 2) MIYAO Yuri, KOBAYASHI Katsuhiko, Akira KINOSHITA, et al., Studies on Design of Recent Skyscrapers (Part 16), Tendencies and Major Works in Indonesia, Summaries of Technical Papers of Annual Meeting, A.I.J., pp. 383-384, Sept. 2015 (in Japanese)
- 3) TACHIBANA Fuko, KOBAYASHI Katsuhiko, Akira KINOSHITA, et al., Studies on Design of Recent Skyscrapers (Part 17), Tendencies and Major Works in Istanbul, Summaries of Technical Papers of Annual Meeting, A.I.J., pp. 385-386, Sept. 2015 (in Japanese)
- 4) NAGAHASHI Yuta, KOBAYASHI Katsuhiko, Akira KINOSHITA, et al., Studies on the Architectural Conversion in Canada, Part 1, Design Methods of Converted Examples in Montreal and Quebec City, Summaries of Technical Papers of Annual Meeting, A.I.J., pp. 401-402, Sept. 2015 (in Japanese)
- 5) KADONO Sho, KOBAYASHI Katsuhiko, Akira KINOSHITA, et al., Studies on the Architectural Conversion in Canada, Part 2, Design Methods in Examples in Toronto and Ottawa, Summaries of Technical Papers of Annual Meeting, A.I.J., pp. 403-404, Sept. 2015 (in Japanese)
- 6) TAKEDA Kanji, KOBAYASHI Katsuhiko, Akira KINOSHITA, et al., Studies on the Architectural Conversion in Canada, Part 3, Design Methods of Converted Examples in Vancouver, Summaries of Technical Papers of Annual Meeting, A.I.J., pp. 405-406, Sept. 2015 (in Japanese)
- 7) KAYAHARA Shun, KOBAYASHI Katsuhiko, Akira KINOSHITA, et al., Studies on the Architectural Conversion in South Korea, Design Methods of Converted Examples in Seoul and Incheon, Summaries of Technical Papers of Annual Meeting, A.I.J., pp. 407-408, Sept. 2015 (in Japanese)

- 8) KINOSHITA Akira, Analysis on "Rural and Urban" expressed in Vanbrugh's Comedy, Focusing on "Journey to London", Summaries of Technical Papers of Annual Meeting, A.I.J., pp. 505-506, Sept. 2015 (in Japanese)
- 9) 3-1 Monographs / Technical books
- 10) KOBAYASHI Katsuhiro, KINOSHITA Akira, et al., Skyscrapers Challenge of Tall Buildings in the World, Kajima Institute Publishing Co., Ltd., Aug. 2015
- 11) 3-2 Research Reports
- 12) KOBAYASHI Katsuhiro, KINOSHITA Akira, et al., Report of Survey on Architectural Conversion in Northern Italy, 200 pages, March 2016

CONSTRUCTION MANAGEMENT AND BUILDING MATERIALS

Yoshinori KITSUTAKA

1. Refereed Papers

- 1) Yusuke UCHIDA, Yoshinori KITSUTAKA, Koichi MATSUZAWA, A study on the effects of corrosion on the strength properties of rebar of high strength and large diameter, Proceedings of the Japan Concrete Institute, Vol.37, No.1, pp.979-984, 2015.7 (in Japanese)
- 2) Koichi MATSUZAWA, Yoshinori KITSUTAKA, Examination on the Internal Stress in ALC Panel, AIJ Journal of Technology and Design, AIJ, No.48, pp.467-470, 2015.6 (in Japanese)
- 3) Yoshikatsu MIZUTANI, Norio SUGAYA, Yoshinori KITSUTAKA, Koichi MATSUZAWA, Masayuki SHIRAIWA, Fireproof Performance of High-density Floor Panel, AIJ Journal of Technology and Design, AIJ, No.48, pp.667-670, 2015.6 (in Japanese)
- 4) Akihiko KATTA, Koichi MATSUZAWA, Yoshinori KITSUTAKA, Yasuei YAGISAWA, Study on pull-out properties of mechanical anchor bolt embedded in concrete following high-temperature heating, International Conference on the Regeneration and Conservation of Concrete Structures, 8p, CD-ROM, 2015.6
- 5) Yoshinori Kitsutaka, Youji Ogawa, Takashi Yokomuro, and Hideki Igawa, Evaluation of X-Ray Shielding Performance for Concrete Box Culvert by Using X-Ray Digital Image and Double Layer Value Analysis Method, Fifth International Conference on Construction Materials, ConMat'15, No.157, 10p, USB, 2015.8
- 6) Yoshinori Kitsutaka, Yukio Oyama, Influence of Fiber Net Reinforced Mortar Repair Coating on the Crack Opening Resistance of Concrete, Concrete 2015, 69th RILEM Week conference, No.278,6p, USB, 2015.8
- 7) Koichi Matsuzawa and Yoshinori Kitsutaka, Influence of heating time on fracture properties of concrete, Transactions, SMiRT23, 9p, USB, 2015.8
- 8) Yoshinori Kitsutaka, Kenta Koyasu, Koichi Matsuzawa, Relationship between Concrete Surface Crack and Corrosion Rate of Rebar Estimated by X-ray, 1st International Conference on Grand Challenges in Construction Materials, 6p, CD-ROM, 2016.3

2. Proceedings of Oral Presentations

- 1) Koichi MATSUZAWA, Yoshinori KITSUTAKA, Relationship between Fracture Properties and Weight Change of Concrete Subjected to High Temperature Heating, Summaries of 69th annual meeting, JCA, pp.258-259, 2015.5 (in Japanese)
- 2) TANIAI Kyosuke, KITSUTAKA Yoshinori, MATSUZAWA Koichi, Study on the distinctive character and the aging of buildings, Summaries of Technical Papers of Annual Meeting, AIJ, pp.449-450, 2015.9 (in Japanese)
- 3) KITSUTAKA Yoshinori, KATTA Akihiko and MATSUZAWA Koichi, Structural Performance Evaluation of Corroded RC members due to Carbonation, Summaries of Technical Papers of Annual Meeting, AIJ, pp.599-560, 2015.9 (in Japanese)
- 4) YAMAUCHI Hiroshi, KITSUTAKA Yoshinori, MATSUZAWA Koichi and KATTA Akihiko, Study on crack-resistant properties of concrete subjected to combined deterioration by heating and carbonation, Summaries of Technical Papers of Annual Meeting, AIJ, pp.723-724, 2015.9 (in Japanese)
- 5) KOYASU Kenta, KITSUTAKA Yoshinori and MATSUZAWA Koichi, Evaluation of the long-term degradation for the reinforced concrete structures using digital X-rays pictures, Summaries of Technical Papers of Annual Meeting, AIJ, pp.749-750, 2015.9 (in Japanese)
- 6) EGUCHI Hideo, YOKOMURO Takashi, KITSUTAKA Yoshinori, IGAWA Hideki, Self crack healing performance evaluation of heavyweight concrete, Summaries of Technical Papers of Annual Meeting, AIJ, pp.775-776, 2015.9 (in Japanese)

- 7) SUGAYA Norio, MIZUTANI Yoshikatsu, KITSUTAKA Yoshinori and MATSUZAWA Koichi, Internal temperature changes of various density ALC panels subjected to heating, Summaries of Technical Papers of Annual Meeting, AIJ, pp.915-916, 2015.9 (in Japanese)
- 8) IKEDO Fumiya, KITSUTAKA Yoshinori, and MATSUZAWA Koichi, Studies on the pull-out strength of the gypsum board connector by repeated loading, Summaries of Technical Papers of Annual Meeting, AIJ, pp.953-954, 2015.9 (in Japanese)
- 9) HATAKEYAMA Shunichi, IKEDO Fumiya, KITSUTAKA Yoshinori and MATSUZAWA Koichi, Study on pull out strength of gypsum board mounting screws, Summaries of Technical Papers of Annual Meeting, AIJ, pp.955-956, 2015.9 (in Japanese)
- 10) KATTA Akihiko, MATSUZAWA Koichi, KITSUTAKA Yoshinori and YAGISAWA Yasuei, Influence of Embedding Depth on Pull-out Properties of Mechanical Anchor in Concrete after High Temperature Heating, Summaries of Technical Papers of Annual Meeting, AIJ, pp.997-998, 2015.9 (in Japanese)
- 11) MATSUZAWA Koichi, KITSUTAKA Yoshinori, Relationship between Crack Resistance and Weight Change of Cementitious Composites Subjected to High Temperature Heating, Summaries of Technical Papers of Annual Meeting, AIJ, pp.197-198, 2015.9 (in Japanese)

Makoto TSUNODA

1. Refereed Papers

- 1) Seiihi OKUMURA, Makoto TSUNODA, Shigeru AOKI, Design Method for the Purpose of The Refining Architecture the Apartment was Devastated Partial Destruction Authorization by the Great East Japan Earthquake, AIJ Journal of Technology and Design, Vol.21, No.49, 1189-1194, Oct., 2015 (in Japanese)

2. Proceedings of Oral Presentations

- 1) Erina AOKI, Makoto TSUNODA, Sangjun YI, A Study on the Actual Condition of Detective Parts after Renovation in Public Facilities -Refining with the Extension of Building, Summaries of Technical Papers of Annual Meeting, AIJ, E-1, pp.889-890, Sep. 2015 (in Japanese)
- 2) Yukiko ARIGA, Makoto TSUNODA, Sangjun YI, A Study on Construction Members for Structure of the External Wall and Possibility of Renovation in Medium Scale Building, Summaries of Technical Papers of Annual Meeting, AIJ, E, pp.885-886, Sep. 2015 (in Japanese)
- 3) Seiihi OKUMURA, Makoto TSUNODA, Shigeru AOKI, Design Method for the Purpose of the Refining Architecture the Apartment was Devastated Partial Destruction Authorization by the Great East Japan Earthquake (1) Design before the Preliminary Investigation that was the Case of S Building at Sendai City., Summaries of Technical Papers of Annual Meeting, AIJ, F, pp.887-888, Sep. 2015 (in Japanese)
- 4) Ryosuke TETAOKA, Makoto TSUNODA, Sangjun YI, Shun-ichi OODATE, A Study on Phased Optimization of Total Amount of Public Facilities in Consideration of Facilities Relocation Part 1 —Facility Evaluation and Utilization Policies for Facility Management—, Summaries of Technical Papers of Annual Meeting, AIJ, F, pp.45-46, Sep. 2015 (in Japanese)
- 5) Shun-ichi OODATE, Makoto TSUNODA, Sangjun YI, A Study on Phased Optimization of Total Amount of Public Facilities in Consideration of Facilities Relocation Part 2 —Construction of Total Optimization Process and Case Studies in Machida-City—, Summaries of Technical Papers of Annual Meeting, AIJ, F pp. pp47-48, Sep. 2015(in Japanese)
- 6) Kwanjong LEE, Makoto TSUNODA, YI Sangjun, Yuchia LIAO, A Study On Current Status of Condition Evaluation (Facility Safety Inspection) Of Building in Korea, Summaries of Technical Papers of Annual Meeting, AIJ, F, pp.57-58, Sep. 2015 (in Japanese)

- 7) LIAO Yuchia, CUI Xueqi, Makoto TSUNODA, Tohru YOSHIKAWA, Research on Housing Regeneration Process of Reaching Household Consensus in Taipei, Summaries of Technical Papers of Annual Meeting, AIJ, F, pp.59-60, Sep. 2015 (in Japanese)
- 8) CUI Xueqi, LIAO Yuchia, Makoto TSUNODA, Tohru YOSHIKAWA, YI Sangjun, Ryo SANUKI, Research on Housing Regeneration Process of Reaching Household Consensus in Taipei, Summaries of Technical Papers of Annual Meeting, AIJ, F, pp.59-60, Sep. 2015 (in Japanese)
- 9) Aki KAMIYAMA, Makoto TSUNODA, A study on the design process in barrier-free renovation of housing, Summaries of Technical Papers of Annual Meeting, AIJ, F, pp.357-358, Sep. 2015 (in Japanese)
- 10) Makoto SAITO, Makoto TSUNODA, A Study on Renovation Prefabricated Apartments for Rent, Summaries of Technical Papers of Annual Meeting, AIJ, F, pp.233-234, Sep. 2015 (in Japanese)

3. Others

3-1 Technical Books

- 1) Syuichi MATUMURA, Makoto TSUNODA, etc., Theory and Practice of Architectural Renovation, ICHIGAYA Syuppansya, p224, Jan. 2016 (in Japanese)
- 2) Makoto TSUNODA, Akio NAKAZAWA, Takenori SUNADA, Lecture of architecture for Beginners: Construction Management for Buildings, ICHIGAYA Syuppansya, p194, Jan. 2016 (in Japanese)

Koichi MATSUZAWA

1. Refereed Papers

- 1) Yoshikatsu MIZUTANI, Yoshinori KITSUTAKA, Koichi MATSUZAWA, Yoshiyuki IEDA, Noriki MATSUO, A study on the evaluation of carbonation progress in ALC based on carbonation-saturated condition, J. Struct. Constr. Eng., AIJ, No.718, pp.1833-1839, 2015. (in Japanese)
- 2) Yusuke UCHIDA, Yoshinori KITSUTAKA, Koichi MATSUZAWA, A study on the effects of corrosion on the strength properties of rebar of high strength and large diameter, Proceedings of the Japan Concrete Institute, Vol.37, No.1, pp.979-984, 2015. (in Japanese)
- 3) Koichi MATSUZAWA, Yoshinori KITSUTAKA, Examination on the Internal Stress in ALC Panel, AIJ Journal of Technology and Design, AIJ, No.48, pp.467-470, 2015.
- 4) Yoshikatsu MIZUTANI, Norio SUGAYA, Yoshinori KITSUTAKA, Koichi MATSUZAWA, Masayuki SHIRAIWA, Fireproof Performance of High-density Floor Panel, AIJ Journal of Technology and Design, AIJ, No.48, pp.667-670, 2015. (in Japanese)
- 5) Yoshinori Kitsutaka, Kenta Koyasu, Koichi Matsuzawa, Relationship between Concrete Surface Crack and Corrosion Rate of Rebar Estimated by X-ray, 1st International Conference on Grand Challenges in Construction Materials, 6p, CD-ROM, 2016.
- 6) Koichi Matsuzawa and Yoshinori Kitsutaka, Influence of heating time on fracture properties of concrete, Transactions, SMiRT23, 9p, USB, 2015.
- 7) Akihiko KATTA, Koichi MATSUZAWA, Yoshinori KITSUTAKA, Yasuei YAGISAWA, Study on pull-out properties of mechanical anchor bolt embedded in concrete following high-temperature heating, International Conference on the Regeneration and Conservation of Concrete Structures, 8p, CD-ROM, 2015.

2. Proceedings of Oral Presentations

- 1) TANIAI Kyosuke, KITSUTAKA Yoshinori, MATSUZAWA Koichi, Study on the distinctive character and the aging of buildings, Summaries of Technical Papers of Annual Meeting, Japan Society For Finishing Technology, pp.87-90, 2015. (in Japanese)

- 2) TANIAI Kyosuke, KITSUTAKA Yoshinori, MATSUZAWA Koichi, Study on the distinctive character and the aging of buildings, Summaries of Technical Papers of Annual Meeting, AIJ, pp.449-450, 2015. (in Japanese)
- 3) KITSUTAKA Yoshinori, KATTA Akihiko and MATSUZAWA Koichi, Structural Performance Evaluation of Corroded RC members due to Carbonation, Summaries of Technical Papers of Annual Meeting, AIJ, pp.599-560, 2015. (in Japanese)
- 4) YAMAUCHI Hiroshi, KITSUTAKA Yoshinori, MATSUZAWA Koichi and KATTA Akihiko, Study on crack-resistant properties of concrete subjected to combined deterioration by heating and carbonation, Summaries of Technical Papers of Annual Meeting, AIJ, pp.723-724, 2015. (in Japanese)
- 5) KOYASU Kenta, KITSUTAKA Yoshinori and MATSUZAWA Koichi, Evaluation of the long-term degradation for the reinforced concrete structures using digital X-rays pictures, Summaries of Technical Papers of Annual Meeting, AIJ, pp.749-750, 2015. (in Japanese)
- 6) SUGAYA Norio, MIZUTANI Yoshikatsu, KITSUTAKA Yoshinori and MATSUZAWA Koichi, Internal temperature changes of various density ALC panels subjected to heating, Summaries of Technical Papers of Annual Meeting, AIJ, pp.915-916, 2015. (in Japanese)
- 7) IKEDO Fumiya, KITSUTAKA Yoshinori, and MATSUZAWA Koichi, Studies on the pull-out strength of the gypsum board connector by repeated loading, Summaries of Technical Papers of Annual Meeting, AIJ, pp.953-954, 2015. (in Japanese)
- 8) HATAKEYAMA Shunichi, IKEDO Fumiya, KITSUTAKA Yoshinori and MATSUZAWA Koichi, Study on pull out strength of gypsum board mounting screws, Summaries of Technical Papers of Annual Meeting, AIJ, pp.955-956, 2015. (in Japanese)
- 9) KATTA Akihiko, MATSUZAWA Koichi, KITSUTAKA Yoshinori and YAGISAWA Yasuei, Influence of Embedding Depth on Pull-out Properties of Mechanical Anchor in Concrete after High Temperature Heating, Summaries of Technical Papers of Annual Meeting, AIJ, pp.997-998, 2015. (in Japanese)
- 10) MATSUZAWA Koichi, KITSUTAKA Yoshinori, Relationship between Crack Resistance and Weight Change of Cementitious Composites Subjected to High Temperature Heating, Summaries of Technical Papers of Annual Meeting, AIJ, pp.197-198, 2015. (in Japanese)
- 11) Koichi MATSUZAWA, Yoshinori KITSUTAKA, Relationship between Fracture Properties and Weight Change of Concrete Subjected to High Temperature Heating, Summaries of 69th annual meeting, JCA, pp.258-259, 2015. (in Japanese)

STRUCTURAL ENGINEERING

Kazuhiro KITAYAMA

1. Refereed papers

- 1) Yuji ISHIKAWA (Takenaka Co.), Masanobu SAKASHITA (BRI), Takeshi KISHIMOTO (Okumura-Gumi), Taku TABATA (Ando-Hazama), Kazuhiro KITAYAMA and Masaki MAEDA (Tohoku Univ.) 2015 Study on Ductility of Reinforced Concrete Beams, Journal of Structural Engineering, Architectural Institute of Japan, Vol. 61B, pp.71-80 (in Japanese).
- 2) Hiromu KATAE and Kazuhiro KITAYAMA 2015 Seismic Performance of Reinforced Concrete Corner Beam-Column Joint under Tri-Directional Loading, Journal of Structural and Construction Engineering, Architectural Institute of Japan, Vol.80, No.713, pp.1133-1143 (in Japanese).
- 3) Kazuya HOSHINO and Kazuhiro KITAYAMA 2015 Analysis Model for Reinforced Concrete Column Focusing on Yield Deformation, Proceedings of the Japan Concrete Institute, Vol.37, No.2, pp. 181-186 (in Japanese).

2. Proceedings for Oral Presentation

- 1) KITAYAMA Kazuhiro, ISHIZUKA Hiroaki, KATAE Hiromu and ENDO Toshiki 2015 Seismic Performance of R/C Corner Beam-Column joints under Axial and Bi-directional Loading (Part1. Outline of Test and Results), Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, Structures IV, pp. 183-184 (in Japanese).
- 2) ISHIZUKA Hiroaki, KITAYAMA Kazuhiro, KATAE Hiromu and ENDO Toshiki 2015 Seismic Performance of R/C Corner Beam-Column joints under Axial and Bi-directional Loading (Part2. Test Results and Discussions), Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, Structures IV, pp. 185-186 (in Japanese).
- 3) KATAE Hiromu and KITAYAMA Kazuhiro 2015 Failure Mechanism of R/C Corner Column-Beam Joint under Tri-directional Loading (Part3.Behavior under Bi-lateral Loading), Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, Structures IV, pp. 143-144 (in Japanese).
- 4) SUZUKI Daiki, SONG Sunghoon, JIN Kiwoong, KITAYAMA Kazuhiro and KANEMOTO Kiyomi (Shimz) 2015 Seismic Performance of Unbonded Precast Prestressed Concrete frame Considering Column-to-Beam Flexural Strength Ratio (Part1 : Test outlines and Results), Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, Structures IV, pp. 711-712 (in Japanese).
- 5) SONG Sunghoon, SUZUKI Daiki, JIN Kiwoong, KITAYAMA Kazuhiro and KANEMOTO Kiyomi (Shimz) 2015 Seismic Performance of Unbonded Precast Prestressed Concrete frame Considering Column-to-Beam Flexural Strength Ratio (Part2 : Test Results and Discussions), Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, Structures IV, pp. 713-714 (in Japanese).
- 6) JIN Kioong, SONG Sunghoon, KITAYAMA Kazuhiro, KANEMOTO Kiyomi (Shimz) and TAJIMA Yuji (Asiss) 2015 Seismic Performance of Precast Prestressed Reinforced Concrete Frame with Beam Flexural Failure Mechanism Assembled by Unbonded Tendons, Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, Structures IV, pp. 737-738 (in Japanese).
- 7) YANG Sen and KITAYAMA Kazuhiro 2015 3D FEM Analysis on Failure Mechanism of R/C Beam-Column Joints, Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, Structures IV, pp. 181-182 (in Japanese).
- 8) HOSHINO Kazuya, KITAYAMA Kazuhiro and ENDO toshiki 2015 Seismic Resistant Performance of Two R/C Buildings Suffering Different Damage under 2011 East Japan Earthquake Regardless of Equal Seismic Capacity Index (Part1. Seismic Resistant Performance of Building Suffering Slight Damage), Summaries of Technical

Papers of Annual Meeting, Architectural Institute of Japan, Structures IV, pp. 387-388 (in Japanese).

- 9) Kazuhiro KITAYAMA 2015 Damage to Reinforced Concrete Beam-Column Joint and Its Studies, Handout of Panel Discussion in R/C Section in Annual Meeting, Architectural Institute of Japan, pp. 27-36 (in Japanese).
- 10) KANEMOTO Kiyomi (Shimz), KITAYAMA Kazuhiro, JIN Kioong and SONG Sunghoon 2015 Structural Performance of Precast Prestressed Reinforced Concrete Frame Assembled by Unbonded Tendons, Proceedings of 24th Symposium on Development of Prestressed Concrete, Japan Prestressed Concrete Institute, pp.113-118 (in Japanese).
- 11) Kazuhiro KITAYAMA 2016 January 3.4.2 Recent Studies on Seismic Performance of R/C Beam-Column Joints (1) Seismic Behavior of R/C Beam-Column Joint under Bi-lateral and Vertical Loading, Second Symposium on Performance Evaluation for Reinforced Concrete Members, Architectural Institute of Japan, pp.105-107 (in Japanese).

3. Others

3-1. Technical books

- 1) Joint Editorial Committee for the Report on the Great East Japan Earthquake Disaster, Report on the Great East Japan Earthquake Disaster, Building Series Volume 1, Reinforced Concrete Buildings (in Japanese), May 2015.

Manabu YOSHIMURA

2. Proceedings for Oral Presentation

- 1) Hidenori MATSUI and Manabu YOSHIMURA: Effect of Transverse Walls on Seismic Performance of Old RC Columns, Summaries of Technical Papers of Annual Meeting, AIJ, Structures IV, pp.85-86, 2015 (in Japanese)
- 2) Shun NADAMI, Manabu YOSHIMURA and Kazuaki HOKI: Estimation of Ductility Index for Reinforced Concrete Columns with Shear Mode, Summaries of Technical Papers of Annual Meeting, AIJ, Structures IV, pp.87-88, 2015 (in Japanese)
- 3) Fuko TACHIBANA, Katsuhiko KOBAYASHI, Manabu YOSHIMURA, Jiro TAKAGI, Akira KINOSHITA, Tetsuya MITAMURA, Yuki TSUKADA and Takuma HASHIMOTO: Studies on Design of Recent Skyscrapers (Part 17) - Tendencies and Major Works in Istanbul -, Summaries of Technical Papers of Annual Meeting, AIJ, History and Theory of Architecture, pp.385-386, 2015 (in Japanese)
- 4) Takuma HASHIMOTO, Tetsuya MITAMURA, Katsuhiko KOBAYASHI, Manabu YOSHIMURA, Jiro TAKAGI, Yuki TSUKADA and Fuko TACHIBANA: Studies on the Architectural Conversion in Istanbul -An Analysis on Trend in Recent Years and Design Methods-, Summaries of Technical Papers of Annual Meeting, AIJ, History and Theory of Architecture, pp.425-426, 2015 (in Japanese)
- 5) Takaya NAKAMURA, Daisuke IMORI and Manabu YOSHIMURA: Collapse Time of Old Reinforced Concrete Buildings, SECED 2015 Conference, Earthquake Risk and Engineering towards a Resilient World, Cambridge UK, 2015

5. Degree

Master Course

- 1) Akie MATSUNAGA, Response Reduction for Buildings with Extreme Torsion by Using Base Isolation System
- 2) Hidenori MATSUI, Effect of Transverse Walls on Seismic Performance of RC Columns - Studies on Strength, Deformability and Ductility Index

Noriko TAKIYAMA

1. Refereed papers

- 1) Haruki Yokota, Noriko Takiyama and Yasuhiro Hayashi: Experimental Study on the Traditional Timber Column-to-Beam Joint to Evaluate of Structural Properties. *Journal of technology and design*, Architectural Institute of Japan, Vol.21, No.48, pp.579-584, June, 2015. (in Japanese)
- 2) Haruki Yokota, Noriko Takiyama and Yasuhiro Hayashi: Experimental Study on Restoring Force Characteristics Evaluation of Column-Beam (Sashigamoi) Joint. *Journal of technology and design*, Architectural Institute of Japan, Vol.21, No.48, pp. 603-608, June, 2015. (in Japanese)
- 3) Noriko Takiyama, Haruki Yokota and Yasuhiro Hayashi: Applicability of Polycarbonate to Reinforce Fitting Type Joint of Traditional Wooden Structure. *Journal of technology and design*, Architectural Institute of Japan, Vol.21, No.48, pp. 609-614, June, 2015. (in Japanese)
- 4) Noriko Takiyama, Fukashi Matsuno, Takeru Kumagai, Naoto Idate, Kohei Hara and Katsuhiro Kobayashi: Conversion of Historic Masonry Constructions and Structural Characteristics of Walls by Intramural Reinforcement, *Proceeding of The 2nd International Conference on Preservation, Maintenance and Rehabilitation of Historical Buildings and Structures (REHAB2015)*, Porto, Portugal, July, 2015
- 5) Noriko Takiyama, Naoto Idate and Yukimasa Yamada: Fitting-type Joint Model for Traditional Wooden Structure, *Proceeding of The 2nd International Conference on Preservation, Maintenance and Rehabilitation of Historical Buildings and Structures (REHAB2015)*, Porto, Portugal, July, 2015
- 6) Noriko Takiyama, Kohei Hara, Ryo Sanuki, Masumi Matsumoto, Tomoyuki Gondo and Shigeru Aoki: An Exhaustive Survey for Renovating Facilities in Densely Built-up Wooden House Areas, *Proceeding of The Eighth International Structural Engineering and Construction Conference*, Sydney, Australia, Nov. 2015
- 7) Noriko Takiyama and Naoto Idate: Seismic Behavior of Frames with Uneven Large Section Beams of Traditional Wooden Structure, *Proceeding of The Eighth International Structural Engineering and Construction Conference*, Sydney, Australia, Nov. 2015
- 8) Yasuhiro Nambu, Mina Sugino, Sunao Kobayashi, Noriko Takiyama, Chiaki Watanabe and Yasuhiro Hayashi: Structural Investigation and Seismic Performance Evaluation of Traditional Wooden Houses in Gojoshinmachi in Nara Prefecture, *Journal of Structural Engineering*, Architectural Institute of Japan, Vol.62B, pp.251-258, 2016.3. (in Japanese)

2. Proceedings for Oral Presentation

- 1) Naoto Idate, Kohei Hara, Fukashi Matsuno and Noriko Takiyama: Reinforcement Effect and Changes in Vibration Characteristic of Brick Wall under Joint Replacement Method by New Materials, Part I: Proposal for Reinforcement Method and Experiment Outline. Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, pp.769-770, 2015.9. (in Japanese)
- 2) Kohei Hara, Fukashi Matsuno, Naoto Idate and Noriko Takiyama: Reinforcement Effect and Changes in Vibration Characteristic of Brick Wall under Joint Replacement Method by New Materials, Part II: Result of Bending Test. Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, pp.771-772, 2015.9. (in Japanese)
- 3) Fukashi Matsuno, Naoto Idate, Kohei Hara and Noriko Takiyama: Reinforcement Effect and Changes in Vibration Characteristic of Brick Wall under Joint Replacement Method by New Materials, Part III: Microtremor Measurement and Eigenvalue Analysis. Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, pp.773-774, 2015.9. (in Japanese)
- 4) Naoto Idate and Noriko Takiyama: Effects of Mechanical Properties on Arrangement of Aseismic Elements of Traditional Wooden Houses, Part II: Static Loading of 2 Span Asymmetry Frames. Architectural Institute of Japan

Kanto Chapter Research Meeting, 86(I), pp.357-360, 2016.3. (in Japanese)

- 5) Akari Yamaguchi, Fumiaki Okamura, Naoto Idate and Noriko Takiyama: Bending Test on Column -Ground Sill Joint Reinforced by Aramid Fiber Sheet. Architectural Institute of Japan Kanto Chapter Research Meeting, 86(I), pp.361-364, 2016.3. (in Japanese)

3-2. Research Reports

- 1) Noriko Takiyama, Naoto Idate, Mitsuhiro Miyamoto, Shinya Matsumoto and Yukimasa Yamada: Experimental Study with Aim of Proposing Improvement of Aseismic Design Method of Traditional Wooden Structure – Restoring Force of Frame with Large Section Beams-, *Journal of the Housing Research Foundation “JUSOKEN”*, No.42, pp.169-178, 2016.3. (in Japanese)

3-3. Manuals/Reviews

- 1) Noriko Takiyama: Case study: Seismic retrofitting of Japanese traditional wooden structure, Mariana Correia, Paulo B. Lourenço and Humberto Varum (eds.), *Seismic Retrofitting: Learning from Vernacular*, CRC/ Taylor and Francis Group, London, pp.113-114, 2015

Kazushige YAMAMURA

3. Others

- 1) co-author, *Guidebook of Recommendation for Loads on Buildings*, Architectural Institute of Japan, 2016.2

Kiwoong JIN

1. Refereed papers

- 1) KANEMOTO Kiyomi (Shimz), KITAYAMA Kazuhiro, SONG Sunghoon and JIN Kioong (2015), Structural Performance of Precast Prestressed Reinforced Concrete Frame Assembled by Unbonded Tendons, *Proceedings of 24th Symposium on Development of Prestressed Concrete*, Japan Prestressed Concrete Institute, pp.113-118 (in Japanese).
- 2) JIN Kiwoong, CHOI Ho (Univ. of Tokyo) and NAKANO Yoshiaki (Univ. of Tokyo) (2016), Experimental study on lateral strength evaluation of unreinforced masonry-infilled RC frame, *Earthquake Spectra* (in-press), doi: <http://dx.doi.org/10.1193/100714EQS152M>.

2. Proceedings for Oral Presentation

- 1) JIN Kioong, SONG Sunghoon, KITAYAMA Kazuhiro, KANEMOTO Kiyomi (Shimz) and TAJIMA Yuji (Asiss) (2015), Seismic Performance of Precast Prestressed Reinforced Concrete Frame with Beam Flexural Failure Mechanism Assembled by Unbonded Tendons, *Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, Structures IV*, pp. 737-738 (in Japanese).
- 2) SUZUKI Daiki, SONG Sunghoon, JIN Kiwoong, KITAYAMA Kazuhiro and KANEMOTO Kiyomi (Shimz) (2015), Seismic Performance of Unbonded Precast Prestressed Concrete frame Considering Column-to-Beam Flexural Strength Ratio (Part1 : Test outlines and Results), *Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, Structures IV*, pp. 711-712 (in Japanese).
- 3) SONG Sunghoon, SUZUKI Daiki, JIN Kiwoong, KITAYAMA Kazuhiro and KANEMOTO Kiyomi (Shimz) (2015), Seismic Performance of Unbonded Precast Prestressed Concrete frame Considering Column-to-Beam Flexural Strength Ratio (Part2 : Test Results and Discussions), *Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, Structures IV*, pp. 713-714 (in Japanese).

ENVIRONMENTAL ENGINEERING

Nobuyuki SUNAGA

1. Refereed Papers

- 1) Yuta ENDOH, Nobuyuki SUNAGA, Hiroko ONODERA, Yuji KAWAKAMI and Yasuhiko HATA, Study on Suggestions of Energy-Saving Behaviors Suitable for Different Household Characteristics in All-Electric Detached Housing - Recommended behavior in terms of ease of implementation and energy reduction effect -, Journal of Environmental Engineering (Transactions of AIJ), Vol.80, No.715, pp.815-825, Sept., 2015
- 2) Eiko KUMAKURA, Nobuyuki SUNAGA, Yui MIYAKAWA and Tomomi FUKASAWA, Influence of Detached House Residents' Behavior on the Thermal Environment of a Common Garden Path in Summer, Proc. of the 31th PLEA International Conference, Paper_0135, Sept., 2015
- 3) Meinan WANG, Nobuyuki SUNAGA Eiko KUMAKURA, Fu NAKAJIMA, Rei KURAMOCHI, Songtao HU, Akinori HOSOI, Jinghui MA and Haiying WANG, Study on the Indoor Thermal Environment of Multi-Unit Residences in Asia, Proc. of the 31th PLEA International Conference, Paper_0412, Sept., 2015

2. Proceedings of Oral Presentations

- 1) Eiko Kumakura, Yui Miyakawa, Nobuyuki Sunaga, Tomomi Fukasawa and Hiroko Onodera, Influence of Detached House Residents' Behavior on the Thermal Environment of a Common Garden Path in Summer, Proc. of the Tenth National Conference of Heat Island Institute International, pp.48-49, Aug., 2015
- 2) OGINO Tsukasa, SAKAI Kosuke, MASUI Shuhei and SUNAGA Nobuyuki, Study of the Active Energy Saving Air-Conditioning Control System Utilizing Adjustment Behavior of Occupants Part3. Following Performance of Active Energy Saving Air-Conditioning Control and Power Reduction Result in Winter, Summaries of Technical Papers of Annual Meeting, A.I.J., D-2, pp.1305-1306, Sept., 2015
- 3) MASUI Shuhei, SUNAGA Nobuyuki, OGINO Tsukasa and SAKAI Kosuke, Study of the Active Energy Saving Air-Conditioning Control System Utilizing Adjustment Behavior of Occupants Part4. Measurement Results in Case of Individual Control of Indoor Unit in Summer, Summaries of Technical Papers of Annual Meeting, A.I.J., D-2, pp.1307-1308, Sept., 2015
- 4) Yuji KAWAKAMI, Nobuyuki SUNAGA, Yasuhiko HATA and Hiroko ONODERA, Study on the energy-saving operation of air-conditioner in winter for high-performance house based on a filed survey, Summaries of Technical Papers of Annual Meeting, SHASEJ, pp.133-138, Sept., 2015
- 5) Reo WATANABE and Nobuyuki SUNAGA, Experimental Study on Thermal Environment of Single-Side Opening Room with Lengthwise Out-swinging Window Which Opens Alternately - Thermal Environment and Temperature Distribution in Middle Season-, Summaries of Technical Papers of Annual Meeting, SHASEJ, pp.189-192, Sept., 2015
- 6) Meinan Wang, Nobuyuki Sunaga and Eiko Kumakura, Study on the Summer Indoor Thermal Environment of Apartments in the Cold Region of China -Taking Qingdao as Example-, Summaries of Technical Papers of Annual Meeting, A.I.J., D-2, pp.323-324, Sept., 2015
- 7) KURAMOCHI Rei, SUNAGA Nobuyuki and KUMAKURA Eiko, Study on thermal environment of apartments focusing on climate divisions and ages -Considerations by literature and measurement surveys-, Summaries of Technical Papers of Annual Meeting, A.I.J., D-2, pp.453-454, Sept., 2015
- 8) KAWAKAMI Yuji, SUNAGA Nobuyuki, ONODERA Hiroko, ENDOH Yuta and HATA Yasuhiko, Study on the Energy-Saving Behavior in Home Part 6. Consideration about the air conditioning energy conservation possibility in spring, Summaries of Technical Papers of Annual Meeting, A.I.J., D-2, pp.457-458, Sept., 2015
- 9) MIYAKAWA Yui, KUMAKURA Eiko and SUNAGA Nobuyuki, Energy-saving Features in Detached Houses

- with a Common Garden Path in Summer Part1 Measurement of Outdoor Thermal Environment and the Behavior of Opening Windows, Summaries of Technical Papers of Annual Meeting, A.I.J., D-2, pp.459-460, Sept., 2015
- 10) Eiko Kumakura, Yui Miyakawa, Nobuyuki Sunaga, Hiroko Onodera and Tomomi Fukasawa, Energy-saving Features in Detached Houses with a Common Garden Path in Summer Part2 Comparison of room air conditioner usage in the residential, Summaries of Technical Papers of Annual Meeting, A.I.J., D-2, pp.461-462, Sept., 2015
 - 11) NAKANO Ikuya, SUNAGA Nobuyuki, ONODERA Hiroko, KUMAKURA Eiko and ROH Hyunwoo, Energy consumption of solar house with many functions in West Tokyo, Summaries of Technical Papers of Annual Meeting, A.I.J., D-2, pp.505-506, Sept., 2015
 - 12) Reo WATANABE and Nobuyuki SUNAGA, Experimental Study on Thermal Environment of Single-Side Opening Room with Vertical Alternately Out Swinging Window –Thermal Environment and Heatstroke Risk on Summer–, Summaries of Technical Papers of Annual Meeting, A.I.J., D-2, pp.529-530, Sept., 2015
 - 13) Ikuya NAKANO, Nobuyuki SUNAGA, Eiko KUMAKURA, Hiroko ONODERA and Hyunwoo ROH, Study on the performance of multifunctional solar house in West Tokyo –Effect of the operational management of air solar system -, Proceedings of JSES/JWEA Joint Conference, pp.151-154, Nov., 2015
 - 14) Rei KURAMOCHI, Nobuyuki SUNAGA and Eiko KUMAKURA, Research of thermal environment of housing complex in hot humid area, Proceedings of JSES/JWEA Joint Conference, pp.351-354, Nov., 2015
 - 15) Keisuke OGURA and Nobuyuki SUNAGA, Research on Energy-Saving Renovation of Existing Detached house -Survey of Energy-Saving Renovation Support Measures and Thermal Environment Improvement Effect of Renovation-, Proceedings of JSES/JWEA Joint Conference, pp.355-358, Nov., 2015
 - 16) Fu NAKASHIMA and Nobuyuki SUNAGA, A Study on Thermal-Insulation Retrofit and Summer Indoor Thermal Environment in Apartment House, Proceedings of JSES/JWEA Joint Conference, pp.359-362, Nov., 2015
 - 17) Reo WATANABE, Nobuyuki SUNAGA, Tadanobu NISHIKAWA and Shizuo IWASE, Study on Thermal Environment of Single-Side Opening Room with Lengthwise Out-swinging Window Which Opens Alternately, Proceedings of JSES/JWEA Joint Conference, pp.377-380, Nov., 2015
 - 18) KAWAKAMI Yuji, SUNAGA Nobuyuki, HATA Yasuhiko and ONODERA Hiroko, Study on the Life-Style and the Energy Saving Potential in High-Performance Detached Houses - Results of the Indoor Thermal Environment and Discussion -, Summaries of Technical Papers of Annual Meeting, A.I.J., No.4048, Mar., 2016

3. Others

3-1 Monographs / Technical books

- 1) Nobuyuki Sunaga, [Chinese Edition] Architectural Environment Theories for Design of Architecture - Find and built the Bio-Climatic Architecture -, Chinese Architectural Industry Publisher, General Editor, pp.3-5, 50-53, 110-115, 121, May, 2015
- 2) Nobuyuki Sunaga, Revised Edition NEW SOLAR ENERGY UTILIZATION HANDBOOK Chp.7 Architecture and Indoor Environment (7.1 Indoor Environment and Energy, 7.3 Room Thermal Environment), Japan Solar Energy Society, pp.220-221, 225-231, Oct., 2015
- 3) Nobuyuki Sunaga et al., Improve the window thermal performance as leaving in single glazing, DETALE Separate Volume, Shokokusha Co.Ltd., pp.106-107, Nov., 2015

Akihiro NAGATA

1. Refereed Papers

- 1) Takashi Yanai and Akihiro Nagata, Study of Air conditioner Performance and Design Method based on Thermal Load Diversity : Part 1 Estimation of the Thermal Load Diversity and Effect for Both Thermal Environment and

Energy Consumption, SHASE Transaction, vol.221, pp.1-10, 2015 (in Japanese)

- 2) Takashi Yanai and Akihiro Nagata, Study of Air conditioner Performance and Design Method based on Thermal Load Diversity : Part 2 Study on Improved Proposal About Air Conditioning System that Considers Thermal Load Diversity, SHASE Transaction, vol.224, pp.47-56, 2015 (in Japanese)

2. Proceedings of Oral Presentations

- 1) Shun Katsumata, Yuichi Murai, Akihiro Nagata, Sachiko Nishikawa, Eiji Sakuma and Taito Kinoshita: A study on the evaluation method of thermal performance for combination of glazing and shading devices : Part 1: Visualization and analysis of airflow between glazing and shading devices, Summaries of Technical Papers of Annual Meeting, AIJ, D-2, pp.21-22, 2015 (in Japanese)
- 2) Yuichi Murai, Shun Katsumata, Akihiro Nagata, Sachiko Nishikawa, Eiji Sakuma and Taito Kinoshita: A study on the evaluation method of thermal performance for combination of glazing and shading devices : Part 2 Comparison of experiment with CFD analysis by two dimensions Model, Summaries of Technical Papers of Annual Meeting, AIJ, D-2, pp.23-24, 2015 (in Japanese)
- 3) Akihiro Nagata: Modeling of the Vertical Temperature Distribution in a Tall Frame Cavity : Part (2) Parameter Estimation by the DNS Database, Summaries of Technical Papers of Annual Meeting, AIJ, D-2, pp.57-58, 2015 (in Japanese)
- 4) Kyu Watanabe and Akihiro Nagata: The Effects on the Amount of Outdoor Air Intrusion through Air Curtain by Human Movement, Summaries of Technical Papers of Annual Meeting, AIJ, D-2, pp.63-64, 2015 (in Japanese)
- 5) Ken Kitazawa and Akihiro Nagata: Thermal Influence that Chair Has on the Pelvis and Thigh, Summaries of Technical Papers of Annual Meeting, AIJ, D-2, pp.407-408, 2015 (in Japanese)
- 6) Kei Karasawa, Akihiro Nagata and Eiko Kumakura: Actual Conditions of Hybrid Air-Conditioning System Using Natural Ventilation in a Mid-Size Office Building, Summaries of Technical Papers of Annual Meeting, AIJ, D-2, pp.711-712, 2015 (in Japanese)
- 7) Ai Enomoto, Katsuhiko Kobayashi, Akihiro Nagata, Akira Kinoshita, Howon Kang and Kei Mizutani: Studies on Design of Recent Skyscrapers (Part 15) : Tendencies and Major Works in South Korea (Seoul, Incheon and Busan) , Summaries of Technical Papers of Annual Meeting, AIJ, F-2, pp.381-382, 2015 (in Japanese)
- 8) Yuri Miyao, Akihiro Nagata, Katsuhiko Kobayashi, Motoki Toriumi, Akira Kinoshita and Kei Mizutani: Studies on Design of Recent Skyscrapers(Part16) : Tendencies and Major Works in Indonesia, Summaries of Technical Papers of Annual Meeting, AIJ, F-2, pp.383-384, 2015 (in Japanese)
- 9) Akihiro Nagata: Can Tall Buildings become Green Buildings ?, The 11th Building Services Symposium of AIJ, pp.65-68, 2015-10 (in Japanese)
- 10) Yuichi Murai, , Akihiro Nagata Shun Katsumata, Sachiko Nishikawa, Eiji Sakuma and Taito Kinoshita: A study on the evaluation method of thermal performance for combination of glazing and shading devices with OpenFOAM, OpenCAE Symposium, 2015-11 (in Japanese)

3. Others

3-1 Monographs / Technical books

- 1) “Design, Performance Evaluation and Application of Heat Shield and Insulation Materials” (Akihiro Nagata: 5-5 Heat Insulating and Shielding Performance of Building Components, pp.220-229), Technical Information Institute, 2015-7 (in Japanese)
- 2) Katsuhiko Kobayashi, Akihiro Nagata, Motoki Toriumi and Akira Kinoshita Ed.: “Skyscrapers - Challenge of Tall Buildings in the World”, Kajima Institute Publishing, 187 pages, 2015-08(in Japanese)

3-3 Manuals / Reviews

- 1) Akihiro Nagata: ISO 52016-1 Calculation of the Energy Needs for Heating and Cooling of Buildings, Journal of JABMEE, p.47, 2016-02 (in Japanese)
- 2) Akihiro Nagata: (Prefatory note) Energy Performance of Buildings, Components and Materials, JTCCM Journal, p.1, 2016-03 (in Japanese)

Eiko KUMAKURA

1. Refereed Papers

- 1) Akinobu Murakami, Eiko Kumakura, and Mikiko Ishikawa Reconstruction of Coastal Villages Swept Away by Tsunami by 3D Digital Model, Journal of Disaster Research Vol.10 No.5, pp.818-829, 2015.9

2. Proceedings of Oral Presentations

- 1) Eiko Kumakura, Reconstruction of Tsunami-Stricken Villages using Procedural modeling, 6th Association for Real-time Imaging and Dynamic Analysis, 2016.3
- 2) Ikuya Nakano, Nobuyuki Sunaga, Eiko Kumakura, Hiroko Onodera and Roh Hyunwoo; Study on the performance of multifunctional solar house in West Tokyo : Effect of the operational management of air solar system, Proceedings of JSES/JWEA Joint Conference, p151-154, 2015.11
- 3) Rei Kuramochi, Nobuyuki Sunaga and Eiko Kumakura; Research of thermal environment of housing complex in hot humid area, Proceedings of JSES/JWEA Joint Conference, p351-354, 2015.11
- 4) Eiko Kumakura, Yui Miyakawa, Nobuyuki Sunaga and Tomomi Fukasawa, Influence of Detached House Residents' Behavior on the Thermal Environment of a Common Garden Path in Summer, The 29th International Conference on Passive and Low Energy Architecture 2015, Proceedings, Bologna, 2015.9
- 5) Meinan Wang, Nobuyuki Sunaga Eiko Kumakura, Fu Nakashima, Rei Kuramochi; STUDY ON THE INDOOR THERMAL ENVIRONMENT OF MULTI-UNIT RESIDENCES IN ASIA, The 29th International Conference on Passive and Low Energy Architecture 2015, Proceedings, Bologna, 2015.9
- 6) Meinan Wang, Nobuyuki Sunaga, Eiko Kumakura, Study on the Summer Indoor Thermal Environment of Apartments in the Cold Region of China —Taking Qingdao as Example-, Summaries of Technical Papers of Annual Meeting, A. I. J., D-1, pp. 323-324, 2015. 9
- 7) Rei Kuramochi, Nobuyuki Sunaga and Eiko Kumakura; Study on thermal environment of apartments focusing on climate divisions and ages : Considerations by literature and measurement surveys, Summaries of Technical Papers of Annual Meeting, A. I. J., D-1, pp. 453-454, 2015. 9 (in Japanese)
- 8) Yui Miyakawa, Eiko Kumakura and Nobuyuki Sunaga; Energy-saving Features in Detached Houses with a Common Garden Path in Summer : Part1 Measurement of Outdoor Thermal Environment and the Behavior of Opening Windows, Summaries of Technical Papers of Annual Meeting, A. I. J., D-1, pp. 459-460, 2015. 9 (in Japanese)
- 9) Eiko Kumakura, Yui Miyakawa, Nobuyuki Sunaga, Hiroko Onodera and Tomomi Fukasawa: Energy-saving Features in Detached Houses with a Common Garden Path in Summer : Part2 Comparison of room air conditioner usage in the residential, Summaries of Technical Papers of Annual Meeting, A. I. J., D-1, pp. 461-462, 2015. 9 (in Japanese),
- 10) Ikuya Nakano, Nobuyuki Sunaga, Eiko Kumakura, Hiroko Onodera and Roh Hyunwoo; Energy consumption of solar house with many functions in West Tokyo, Summaries of Technical Papers of Annual Meeting, A. I. J., D-1, pp. 505-506, 2015. 9 (in Japanese)
- 11) Kei Karasawa, Akihiro Nagata and Eiko Kumakura; Actual Conditions of Hybrid Air-Conditioning System Using Natural Ventilation in a Mid-Size Office Building, Summaries of Technical Papers of Annual Meeting, A. I. J.,

D-1, pp. 711-712, 2015. 9 (in Japanese)

- 12) Eiko Kumakura, Yui Miyakawa, Nobuyuki Sunaga, Hiroko Onodera and Tomomi Fukasawa; Influence of detached house resident' behavior on the thermal environment, 10th conference of Hear Island Institute International in Japan, Proceedings, Ssiysms, p48-49, 2015.8 (in Japanese) (Best Paper award)