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Overview of Research Activities in 2010

Architectural Planning/ City Planning

【Jun UENO・Masumi MATSUMOTO】

【Tohru YOSHIKAWA】

Development of Methods for Construction of Community Facilities Network Utilizing Existing Public Buildings

Tohru YOSHIKAWA and Kazuki YANAGISAWA (Value Management Institute, Inc.)

This study aims at developing methods for Construction of community facilities network suitable for the information, aged and mature society of Japan. To this end, methods to determine the optimum locations of community facilities utilizing existing public buildings are developed based on an interdisciplinary study. The method was applied to Tama City, which includes the earliest development of Tama New Town, in Tokyo Metropolis. Especially, a new model for distance decay of user distribution of day service centers for the elderly etc. was refined and published.

Development of Platform for Sharing Regional Information utilizing ASP for Map Delivery

Tohru YOSHIKAWA and Hidenori TAMAGAWA

The purpose of this study is to support to build social infrastructure for sharing regional information by the Internet in the matured information society for which Japan is heading. To this end, an information platform, which is low-cost, flexible and open, is developed based on ASP for map delivery on the Internet. The practicality of the platform is tested using a collaborative experimental web site with municipalities and residents. Especially, an experimental analysis was made on creating links between municipal newsletters and web maps.

【Motoki TORIUMI】

【Naoki KUROKAWA】

Historical studies on American Architecture and Landscape Design, and Creative Reuse of Architectural Stock

Naoki KUROKAWA

Pursuing the cultural induction, advancing notion upon the Japanese architecture and landscape design on the American soil was exploited through the grandest international exposition. Researches regarding to urban revitalization project by means of adaptive reuse of building stock were continually conducted on four cases, domestic and overseas.

Architectural Design and History

【Katsuhiro KOBAYASHI・Akira KINOSHITA】

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 2010, architectural works of Le Corbusier, Richard Meier and so on were analyzed. These studies were published in Journal of Architecture, Planning (Transactions of A.I.J).

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 work. Thereby theory and practice, in other words, basic research and high-level application would be synthesized. In the academic year of 2010, three master students' design works are made. In addition, design work for architectural competition " the energy-saving next-generation house model" held by Yokohama-city was awarded the first prize.

Research on Conversion and Renovation of Existing Building Stocks

Katsuhiro KOBAYASHI, Akira KINOSHITA

It is becoming one of the most important and social subject in architectural field of Japan to find out and create various methods to revitalize the existing building stocks. In the academic year of 2007, from the viewpoint of architectural design, we published books on conversion buildings located in U.S.A., Italy, France, Germany, Australia and Finland. In the academic year of 2010, we executed research trips to investigate conversion buildings in Denmark, Sweden, Austria, Switzerland, and Shanghai(China), and made research reports on these works.

【Yukimasa YAMADA】

Studies on the Architectural History of Timber Churches in the Northern Vietnam

Yukimasa YAMADA, Ryuta OHASHI (Tokyo Kasei Gakuin Univ.)

Christianity in Vietnam, since its introduction early in the sixteenth century, has been evolving and expanding to an indigenous culture through the different society, convention and thoughts from European countries. We are focusing attention on two Catholic dioceses that have been played most important rolls in the history and culture of Christianity in the Northern Vietnam, Bui-Chu diocese and Phat-Diem diocese. Collaborating with the administration office of each diocese, we attempt to conduct surveys and analysis of existing timber churches, and to show their architectural features and the process of

their transition. And also, we try to build up the multi-directionally-operated Database System, through sharing information with religious communities and their supporters for the preservation and activation of culture and tradition in the Northern Vietnamese Christianity. In this fiscal year, we have held workshops at two churches in Bui-Chu, reporting the results from our surveys and discussing the cultural values and preservation of timber churches

Studies on the Architectural Education in Modern Japan

Yukimasa YAMADA, Noriyoshi ICHIKAWA

In recent years, the expanding globalization has caused significant ripples through Japanese architectural society, and the demands for making changes or improvements have become more vociferous, in particular, on the issue of the qualifications of architect. Under such circumstances, it is critically important to examine the Japanese own educational system built up since the modern Meiji Period, following European models, but not being absorbed directly. We have once reviewed the current situation of Vietnamese architectural education, and in this fiscal year we have followed the personal accomplishments of Dr. Tatsutaro NAKAMURA, a professors of the Imperial college of Engineering, and have discussed his historical significance in the building equipment education of modern Japan

Surveys and Studies on Preservation and Activation of Historical Environment with Comprehending the Values of Cultural Properties

Yukimasa YAMADA

We should comprehend and maintain the cultural properties including their surroundings, without classifying according to some categories, and we should surely hand over them to the next generation as a nucleus of town planning. Standing by this basic idea, under a three-year pilot project comprehending cultural properties by Agency for Cultural Affairs we have conducted surveys and studies in Hinode-machi, Tokyo since last year. In this fiscal year, we have reported some findings from the surveys in the Tera-machi Area in Kanazawa and have discussed the process of reconstruction and expansion to churches in Nagasaki and Sasebo.

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 have discussed on the issue of acceptance and evolution of elements from different cultures in the Islamic world in the medieval period, and have conducted a survey of Chinese mosques in Ning Xia to report their architectural features in the 2010 annual meeting of A.I.J..

【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.

【Jun INOKUMA】

【Tomohiko AMEMIYA】

Construction Management and Building Materials

【Seiichi FUKAO・Kozo KADOWAMKI】

Research on Activation Method of Public Residential Buildings Built in the Mass-housing Era

Seiichi FUKAO and Kozo KADOWAKI

Most of public residential buildings built in the mass-housing era require to be refurbished. In FY2010, we developed a technology to make a new opening in the precast concrete wall panel of the residential buildings. We also investigated the actual conditions of residential building regeneration in European countries.

Research on the Construction of Multi-unit Residential Building

Seiichi FUKAO and Kozo KADOWAKI

S/I housing, of which building system is designed dividing into two parts: skeleton (or support, structural elements) and infill (interior components), is widely noticed as a promising building system of multi-unit residential building. In FY2010, we promoted a research on flexibility of dwelling unit design in residential

buildings.

Research on Conventional Wooden Construciton in Detached Houses

Seiichi FUKAO and Kozo KADOWAKI

Conventional wooden construction in Japan is widely applicable for designing of building. In FY2010, we promoted design of two detached houses to which conventional wooden construction was applied to show its applicability by realizing a new design of spaces.

【Yoshinori KITSUTAKA・Koichi MATSUZAWA・Masayuki TSUKAGOSHI】

Concrete shear crack controlling effect by tile finishing

Yoshinori KITSUTAKA and Koichi MATSUZAWA

The delamination of external tile finishing is caused by a gap between shear deformation of concrete and tile. In this study, the shear crack controlling effect by finishing tile is investigated. The test method by four-point shear loading was proposed to examine the delamination resistance of attached tile under shear force. It became clear that the use of fiber for attaching mortar was effective to reduce the tile and concrete cracking under shear force.

The influence of reinforcing bar corrosion on the crack opening width of reinforced concrete surface

Yoshinori KITSUTAKA, Koichi MATSUZAWA and Masayuki TSUKAGOSHI

The influence of reinforcing bar corrosion on the crack opening width of reinforced concrete surface was investigated. The corrosion accelerating tests of reinforced concrete model specimens were performed for the various concrete strength, concrete cover, rebar diameter. FEM analysis method was used in order to predict the crack width of concrete surface due to the expansive force of corroded reinforcing bar. The results of crack width obtained from the accelerating test agreed well with the results of FEM analysis.

Reducing Effect of Carbon dioxide by Cementitious Building Finishing Materials

Yoshinori KITSUTAKA and Koichi MATSUZAWA

In this study, we focused on the carbon dioxide capturing ability of cementitious materials for the use of the building wall finishing. Carbon dioxide capturing tests were performed for various finishing materials by using the 10-liter tedla bag filled with 20% concentration carbon dioxide gas and with a finishing material. Reduction of the concentration of carbon dioxide gas in the tedla bag was measured by the carbon dioxide detector tube. Finishing materials such as Japanese plaster, diatomite, autoclaved aerated concrete, moisture control finishing, mortar, tile were used for the carbon dioxide capturing test. It was found that the materials including the chemical elemen of calcium have high carbon dioxide capturing ability.

Influence of relation relative humidity on carbonation of concrete under high temperature condition

Yoshinori KITSUTAKA, Koichi MATSUZAWA and Masayuki TSUKAGOSHI

Carbonation is one of the main factors that cause degradation of concrete structures. In most of the previous studies conducted on carbonation, the carbonation rate was examined in a normal environment, i.e., in the case of reinforced-concrete buildings used for residential purposes. In this study, however, we aim to reveal the effect of humidity on the rate of carbonation by conducting accelerated carbonation tests at high temperatures; for this purpose, we simulate a scenario where concrete is exposed to high temperatures, as in the case of a factory or a power generation plant. Moreover the examination results were compared with the results from a previous study, and estimation method of carbonation rate under the high temperature environment was proposed.

Strength Properties of Mortar Subjected to Triaxial Stress in Hardening Process

Koichi MATSUZAWA and Yoshinori KITSUTAKA

At early ages during hardening, mass concrete is affected by high temperatures due to cement hydration, changes in moisture content due to moisture transfer, and temperature stress due to differences between the surface and internal temperatures of concrete. It is therefore necessary for elucidating the strength-developing properties of mass concrete to comprehensively investigate the temperature, moisture content, and stress. In this study, the authors investigated the strength properties and pore size distribution of mortar cured under different temperature, humidity, and triaxial stress conditions during early hardening period up to an age of 3 days.

【Makoto TSUNODA】

Structural Engineering

【Manabu YOSHIMURA・Takaya NAKAMURA】

Study on Ductility Index of Reinfoeced Concrete Columns with Shear Mode

Manabu YOSHIMURA and Takaya NAKAMURA

The Standard for Seismic Evaluation for Existing RC Buildings defines ductility indices for columns with various failure modes and assigns values of 0.8 and 1.00 to 1.27, respectively to Very Brittle Column and Shear Column. But the Standard does not consider the effect of dynamic responses to determine the above values unlike the case with Flexure Column. This paper is intended to present a method to determine ductility indices of Very Brittle Column and Shear Column, where deformation capacity of these columns until collapse and the effect of dynamic responses are considered.

Collapse Drift of Reinforced Concrete Columns Subjected to Decreased Axial Load

Manabu YOSHIMURA and Takaya NAKAMURA

Axial load that RC columns are subjected to becomes lower than the initial value when they undergo axial shortening because of shear failure. The effect of such decreased axial load on collapse drift of collumns was studied. The study has revealed that, (1)collapse drift is larger for columns with decreased axial load than for columns with constant axial load, by two times to six times even for the cases that axial load was decreased at near collpase, and (2)collapse drift is larger as the poiont at which axial load is decreased is earlier.

Relations between Construction Year and Earthquake Damages for RC Buildings

Takaya Nakamura and Manabu Yoshimura

In the event of Great Hanshin Earthquake in 1995, while many of school buildings constructed in the 1960th suffered severe damages, a few of those constructed before and after the 1960th did. Buildings after 1971 are rather safe because of the code revision in that year that minimum hoop spacing is reduced to 10 cm. But that revision can not explain buildings before the 1960th were also rather safe. Studies on damages to such old buildings have revealed that old buildings with a lot of column main bars could escape from severe damages. This is because of the known fact that the column axial load carrying capacity becomes greater as the amount of main bars is larger. Old buildings often have a lot of column main bars as compared to even recent buildings.

【Kazuhiro KITAYAMA】

1. Estimation of Earthquake Resistant Performance for Prestressed Reinforced Concrete Beams in Interior Beam-Column Subassemblages

KITAYAMA Kazuhiro

Performance-based design for earthquake resistance of buildings is aimed in the world, which can control structural behavior of each member and a whole building during earthquakes. It is necessary to evaluate a force-deformation envelope curve and hysteresis loops of a member and grasp damage levels in a member accompanied with those characteristics in order to establish performance-based earthquake resistant design methodology. There is, however, few experimental data available to develop such the performance-based design methodology because earthquake resistant performance of prestressed reinforced concrete (PRC) members changes remarkably with many variations of arrangement of steel bars and PC tendons, depending on bond situation along such longitudinal reinforcement surrounded by concrete or grout mortar.

Therefore, four PRC interior beam-column subassemblage specimens which were designed to form beam yielding mechanism were fabricated for a test under static load reversals to investigate the influence of bond situation along PC tendons on earthquake resistant performance of PRC beams. Tests will be carried out in 2011. Hysteretic characteristics, bond along beam longitudinal reinforcement, plastic hinge length, residual crack width and deformation, some limit states for beams and energy dissipating capacity

will be studied.

A deformed PC bar with a 22 mm diameter, a plain PC bar with a 21 mm diameter and a PC strand with a 17.8 mm diameter was used for beam longitudinal reinforcement, which was placed with two deformed steel bars with a 13 mm diameter at the top and the bottom of a beam section in respective specimens. A specimen which has two plain steel bars with a 13 mm diameter at the top and the bottom of a beam section was added to investigate the influence of interaction between bond situations along PC tendons and steel bars.

2. Advanced Estimation Method for Earthquake Resistant Performance of Beams in Reinforced Concrete Frame

KITAYAMA Kazuhiro and MINAMI Susumu

Deformation capacity of reinforced concrete (R/C) beams in beam-column moment-resisting frames can be estimated precisely up to yielding of longitudinal reinforcement according to Guidelines for Performance Evaluation of Earthquake Resistant R/C Buildings published by Architectural Institute of Japan in 2004. The proposed method to estimate deformation capacity corresponding to a restorable limit and a safety limit for R/C beams, however, is not verified through laboratory tests.

Therefore, three cruciform beam-column subassemblage specimens were tested to investigate deformation capacity of beams, especially focusing on additional deformation due to pullout of a beam longitudinal bar from both a beam-column joint panel and a beam member caused by bond deterioration along beam bars. A diameter of a beam longitudinal bar, i.e., 13 mm or 22 mm and a depth of a beam section, i.e., 400 mm or 250 mm, were varied in the test. Ultimate moment capacity in a column section at a center of a beam-column joint was designed to be 2.7 times to 4.9 times that in a beam section. A beam-column joint panel was designed not to fail in shear by providing 1.4 times to 2.8 times greater shear strength than that predicted by AIJ Design Guidelines for Earthquake Resistant R/C Buildings Based on Inelastic Displacement Concept published in 1999. Concrete compressive strength by cylinder tests ranged from 31 MPa to 33 MPa.

Beam yielding took place for three specimens. One specimen, however, eventually failed in joint shear which had an ultimate moment capacity ratio of a column section to a beam section of 2.7. Other specimens reached peak lateral load-carrying capacity due to concrete crushing at beam ends. Hysteresis loops of a specimen with a 13 mm diameter of a beam bar resulted in a spindle shape in contrast to those of a specimen with a 22 mm diameter of a beam bar, which exhibited a pinching shape due to bond deterioration along beam bars within a joint panel.

A force-deformation envelope curve for all R/C beams was well predicted up to beam yielding by the AIJ Guidelines for Performance Evaluation of Earthquake Resistant R/C Buildings. Predicted deformation capacity corresponding to cover concrete crushing at a beam end, however, exceeded two times that observed for a specimen with a 400 mm depth of a beam section. This was caused by overestimation of deformation components attributed to pullout of a beam bar from both a joint panel and a beam member.

Deformation capacity corresponding to a residual crack width of 1.0 mm in a beam, one of the facts which determine the first restorable limit state, predicted by the AIJ Guidelines for Performance Evaluation of Earthquake Resistant R/C Buildings agreed well with that observed in a test. A peak deflection angle of a beam corresponding to a residual crack width of 1.0 mm was 0.91 percent for a specimen with a 13 mm diameter of a beam bar, which was smaller than that for a specimen with a 22 mm diameter of a beam bar, i.e., 1.50 percent.

3. Comparison of Ultimate Shear Strength Estimation Formulae for Reinforced Concrete Beam and Perforated Beam

KITAYAMA Kazuhiro

AIJ Standard for Structural Calculation of Reinforced Concrete Structures is available as one of allowable stress design methods in a system of earthquake resistant design regulated by Building Standard Law in Japan. However, standards for calculating lateral load-carrying capacity based on an anticipated deformation of a R/C building designed to form flexural yielding mechanism in beams, columns and walls are not prepared in Architectural Institute of Japan. Therefore as one of pre-works for providing such a standard, accuracy of ultimate shear strength predicted by some estimation formulae was verified for R/C beams and perforated beams failing in shear or bond splitting prior to beam yielding through newly collected test results.

A data-base set was built by surveying previous test results published in literatures, i.e., Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan in 1996 to 2010 (2000 to 2010 as for perforated beams) and Proceedings of the Japan Concrete Institute in 1990 to 2000. R/C beams and perforated beams which failed in shear or bond splitting prior to beam yielding were collected among test results of a simple beam, a cantilever beam and a beam subjected to anti-symmetric bending moment at both ends. Bond slip failure along plain beam bars was omitted. For perforated beams, shear failure in the vicinity of an opening was targeted. Beams made of light-weight concrete and high-strength concrete, beams with a T-shaped section and beams with multi-openings were included in the data-base set. Beams without shear reinforcement were excluded in this study.

A number of specimens thus collected in the data-base set was 440 for beams failing in shear, 104 for beams failing in bond splitting and 425 for perforated beams failing in shear. The range of primary properties for these specimens is as follows; concrete compressive strength of 4.2 to 167 N/mm^2, yield strength of a longitudinal bar of 295 to 1383 N/mm^2, yield strength of shear reinforcement of 176 to 1767 N/mm^2, tensile reinforcement ratio in a beam section of 0.48 to 9.30 percent, shear reinforcement ratio of 0.04 to 2.85 percent and shear span ratio of 0.29 to 3.50.

Arakawa Mean Formula and two provisions, called as A Method and B Method, according to AIJ Design Guidelines for Earthquake Resistant R/C Buildings Based on Inelastic Displacement Concept in 1999 were used to predict ultimate shear strength for R/C beams. Arakawa Mean Formula modified by Hirosawa

to account for existence of an opening, called as Modified Hirosawa Formula, was used for perforated beams.

Following conclusions were drawn by comparing test results with predicted ones by above-mentioned estimation formulae.

1) For beams failing in shear, made of normal-weight concrete, Arakawa Mean Formula and A Method provision assuming no plastic rotation at a hinge region was able to predict ultimate shear strength with equal accuracy, i.e., indicating an average value of 1.16 and a coefficient of variation of 0.28 for a ratio of test results to predicted ones. On the other hand, B Method provision overestimated test results, indicating an average ratio of test results to predicted ones of 0.86.

2) For beams made of normal-weight concrete, Arakawa Mean Formula was able to predict shear strength for bond splitting failure with same accuracy as that for shear failure, i.e., indicating an average value of 1.18 and a coefficient of variation of 0.23 for a ratio of test results to predicted ones although Arakawa Mean Formula does not take positively bond splitting failure into account.

3) Modified Hirosawa Formula was conservative for predicting ultimate shear strength for perforated beams made of normal-weight concrete.

4. Verification Test for Failure Mechanism of Reinforced Concrete Cruciform Beam-Column Joint

KITAYAMA Kazuhiro

Current earthquake resistant design for reinforced concrete beam-column joints has intended to prevent the joint from failing in shear by limiting input shear force into the joint, and has aimed to maintain energy dissipation by preventing excessive slip of longitudinal reinforcing bars passing through the beam-column joint. Hitherto uniform shear distortion is conceived to occur in a beam-column joint panel due to both opening of diagonal shear cracks and crushing of concrete along a diagonal compression strut which is parallel to shear cracks. Thus deformation of the joint panel can be represented by only a shear distortion angle. This concept is easily comprehended because of correspondence to above-mentioned shear failure mechanism of a beam-column joint. In this concept, however, joint panel deformation occurs regardless of the deformation mode of beams and columns framing into the joint panel.

On the other hand, Shiohara proposed a new mechanics model for joint failure, which has nine degree-of-freedom and shows deformation mechanism based on opening of diagonal cracks and strain distribution in a joint panel. Shiohara also proposed a formulation to estimate joint ultimate strength and a limitation of the reinforcing amount in a joint panel on the basis of this new model. A new model proposed by Shiohara, which reflects quite different concept from current one for joint failure mechanics, indicates that a beam-column joint panel does not fail in shear but fails in flexure.

Based on new failure mechanism proposed by Shiohara, a beam-column joint in a cruciform subassemblage which has almost same ultimate flexural capacity for both sections of beams and columns tends to fail due to a concentration of deformation generated from wide opening of diagonal cracks after

yielding of both longitudinal bars of beams and columns. Moreover, the closer is the ultimate flexural capacity in a beam section to that in a column section, the more pinching shape does a hysteretic loop of a force-deformation relation exhibit, representing poor energy dissipation.

Tajiri and Suwada carried out static loading tests of R/C cruciform beam-column subassemblages to verify confining effect of elements such as joint lateral reinforcement, column axial load and column intermediate longitudinal bars on the expansion of a beam-column joint panel. It was found by the tests that an equivalent viscous damping ratio for a force-deformation relation increases with column compressive axial load. The influence of column compressive axial load, however, is not obvious because the ratio of ultimate flexural capacity of a column section to a beam section became greater than unity with the increase in column compressive axial load.

Adequacy of a failure mechanics model of a joint panel newly proposed by Shiohara was verified in this study through static loading tests of five R/C cruciform beam-column subassemblage specimens where primary factors associated with stiffness, lateral capacity and damage of a joint panel were changed, i.e., the ratio of ultimate flexural capacity of a column section to a beam section, column axial load in tension and compression and an aspect ratio of a height to a depth of a beam-column joint panel. A column section with 350 mm squares and a beam section with a depth of 400 mm and a width of 250 mm were common for all specimens. Hereafter, test results were summarized for two specimens which had the ultimate flexural capacity ratio of a column section to a beam section of 1.3 and 1.8 respectively.

1) A beam-column joint panel eventually failed for both specimens after beam and column longitudinal bars yielded, showing pinching hysteresis loops.

2) A peak story shear force for both specimens was 1.1 times as great as a story shear force at ultimate flexural capacity of a beam section computed by $0.9a_t s_y d$. On the other hand, a peak story shear force for both specimens was approximately 0.9 times that predicted by a Shiohara's model.

3) A peak story shear force was almost equal for both specimens regardless of a different flexural capacity ratio of a column section to a beam section.

5. Analytical Estimation of Limit States for Prestressed Reinforced Concrete Beam in Moment Resisting Frame

KITAYAMA Kazuhiro

For development of performance-based earthquake resistant design for a prestressed reinforced concrete (called PRC) building, it is necessary to provide definitely several limit states corresponding to a required performance level using physical properties such as strains induced in materials and crack widths. A restorable limit state was defined by a residual deflection angle for PRC beams in cruciform beam-column subassemblage specimens tested in 2009. This indicates that it is very important to estimate a residual deflection angle of a PRC beam precisely.

Section analyses for a member assuming that a plane section remains plane is convenient to

examine damage levels of the member analytically. Therefore, several limit states were studied for PRC beams through section analyses with the Navier's hypothesis. Evaluation method for relationship between a residual deflection angle and a residual crack width for a PRC beam which are regarded as one of a damage index was proposed.

Bond between surrounding concrete and a PC tendon was considered indirectly for section analyses with the Navier's hypothesis by the strain compatibility factor *F* which was proposed by Muguruma Hiroshi. In contrast, perfect bond between surrounding concrete and a longitudinal steel bar was assumed for the section analysis. A beam deflection angle after a section yields was computed as the product of a sectional curvature and an equivalent plastic hinge length proposed by Sumida and Kishimoto. A maximum residual crack width in a PRC beam was estimated by using for convenience the evaluation method for RC beams according to Guidelines for Performance Evaluation of Earthquake Resistant R/C Buildings published by Architectural Institute of Japan in 2004.

Following conclusions were taken by comparison between computed and tested results.

1) Result computed with the combination of both section analyses assuming that a plane section remains plane and the equivalent plastic hinge length proposed by Sumida and Kishimoto agreed well with a force-deformation envelope curve observed for PRC beams in cruciform beam-column subassemblage tests.

2) Relationship between a residual deflection angle and a residual crack width for a PRC beam was able to be estimated by the same method as that for a R/C beam. Some problems, however, remain for the identification of some constants and the accuracy.

3) A serviceable limit state was defined by yielding of a beam longitudinal bar and a restorable limit state by a residual deflection angle for PRC beams for both prediction and a test. A peak deflection angle corresponding to both limit states was able to be obtained well by the analysis.

6. Seismic Behavior for Existing Precast Reinforced Concrete Shear Wall with New Opening

KITAYAMA Kazuhiro, MINAMI Susumu and TAKAGI Jiro

Assuming that a new opening is provided to a shear wall in existing buildings constructed by reinforced concrete precast wall system (Called WPC), eight three-dimensional half-scale specimens with slabs and orthogonal walls to a web wall were tested in 2009 under static load reversals to study on influence of a new opening and effect of retrofit on seismic behavior. Four specimens, i.e., a control specimen with no opening, a specimen with an opening at only a second floor wall, and specimens strengthened by reinforced concrete or steel around a new opening, were picked up to study on the lateral load-carrying and deformation capacity and the effect of retrofit on failure process. Four specimens failed by the rupture of fillet welding at a horizontal steel-joint which connects an upper precast R/C wall panel with a lower one.

Conclusions taken by the study are as follows. An ultimate limit deformation angle in the test was defined as a story drift angle in the second story of a specimen when a lateral force capacity descended to 0.8 times the peak capacity.

1) Comparing specimens with or without a new opening, an uplift deformation became smaller at a respective horizontal steel-joint for the specimen with a new opening than that without a opening. This was caused by uniform distribution of an uplift deformation at several horizontal steel-joints in second and third floor levels for a specimen with a new opening. Thus, this enhanced the nominal lateral deformation capacity for the wall with a new opening, i.e., an ultimate limit drift angle of 1.7 %, but resulted in the decrease in a initial stiffness of the specimen.

2) The second level procedure of seismic capacity evaluation, which is provided by Guidelines for Evaluation of Seismic Capacity of Existing WPC Buildings revised in 2008 by Japan Building Disaster Prevention Association, can predict the lateral load-carrying capacity at flexural yielding for a wall without an opening.

3) A ductility index F of 2.0, which is equal to an ultimate limit drift angle of 1.22 %, for a WPC wall without an opening provided by seismic capacity evaluation above-mentioned was 2 to 3 times as great as an ultimate limit deformation angle obtained in the test. For retrofitted specimens by reinforced concrete or steel around a new opening, an ultimate limit drift angle ranged from 0.7 % to 1.0 % accompanied by enhancement of lateral force capacity, and it deteriorated remarkably in comparison with a wall without retrofit around a new opening.

7. Earthquake Resistant Performance of Mid-rise R/C Building Surviving after 1995 Hyogo-ken Nanbu Earthquake

KITAYAMA Kazuhiro and AOKI Shigeru

A reinforced concrete five-story building which is used as a medical clinic is located at Nada Ward in Kobe City, and was refined in 2009 by Shigeru Aoki Architect & Partners. The building was judged to suffer no-damage by quick inspection carried out by Architectural Institute of Japan immediately after Hyogo-ken Nanbu Earthquake in 1995. Neighborhood R/C buildings, however, had such remarkable damage as collapse or heavy damage. When finish no-structural elements in the building were removed, much poor execution of concrete work and many damages by the earthquake were observed in many members of the building. The third level procedure of seismic capacity evaluation for existing R/C buildings executed by Aoki Architect & Partners indicated that the building had poor seismic performance in first to fourth floor levels in a transverse direction. Therefore, the reason why the building could survive the earthquake was investigated by the second level procedure of seismic capacity evaluation and earthquake response analyses using a multi-degrees-of-freedom system.

The building, which has four bays in a longitudinal direction and two bays in a transverse direction with a two-story annex of two by two spans, was built in 1972 and underwent 1995 Hyogo-ken Nanbu Earthquake. There are many shear walls in a longitudinal direction but a few in a transverse direction. Many columns have a square section with a width of 600 mm, and shear reinforcement placed at a center-to-center distance of 150 mm and 200 mm in the first and second floor levels and the third to fifth

floor levels respectively.

Many damages due to the earthquake were observed in the first-story columns which were decided as the third grade damage caused by shear cracks or spalling-off of concrete. Three pilotis columns suffered also the third grade damage. Several boundary beams connecting between a mid-rise part of the building and the low-rise annex failed in shear. The whole building was estimated to suffer medium damage by quick estimation for residual seismic performance, indicating that the ratio of residual seismic resistant performance for a damaged building to that for the sound one before suffering a damage was 0.62 at the fourth floor level.

The second level procedure of seismic capacity evaluation was carried out taking the degradation of shear strength caused by rock pockets of R/C columns and the enhancement of lateral load-carrying capacity due to R/C walls located at an out-of-plane of a beam-column frame into account. Concrete brick walls were neglected in the procedure. The seismic index *Is* decreased as much as 0.06 and 0.04 due to rock pockets of R/C columns for the first floor level in a longitudinal direction and the fourth floor level in a transverse direction respectively. On the other hand, out-of-plane R/C walls enhanced remarkably the seismic index *Is* as much as 0.14, 0.11, 0.17 and 0.20 for the second to fifth floor levels respectively in a transverse direction. Hence the building has possessed the seismic index *Is* greater than approximately 0.6 except for the first floor level in a transverse direction when rock pockets of R/C columns and out-of-plane R/C walls are considered simultaneously. It seems that the building was able to survive the 1995 earthquake because out-of-plane R/C walls played a significant role to resist the earthquake-induced load efficiently.

Through earthquake response analyses using a multi-degrees-of-freedom system based on results by the second level procedure of seismic capacity evaluation, it was found that the degradation of shear strength caused by rock pockets of R/C columns gave an ill influence to earthquake response in a longitudinal direction of the building. Results obtained by the analysis agreed well with the actual damage of the building in a longitudinal direction. A story drift angle for the first story in a transverse direction reached 1.86 % in the analysis which was greater than that for other stories. In the analysis, shear walls and columns failed in shear and flexural columns yielded, being different from damage situation observed in the actual building. Since several R/C beams failed in shear actually, input shear force to columns during the actual earthquake was reduced to some extent and this caused probably the difference.

8. Construction of Data-Base Set for Prestressed Reinforced Concrete Beam-Column Subassemblage Test Results

KITAYAMA Kazuhiro

A data-base set was constructed by collecting properties and test results of 50 PRC beam-column subassemblage specimens tested previously by Kitayama Laboratory and Kishida Laboratory of Shibaura Institute of Technology. Using this data-base set, following studies were carried out;

1) quantitative estimation of deformation at several events in a force-deformation envelope curve such as

cracking, yielding of a steel bar and a PC tendon, crushing of cover concrete and rupture of a steel bar and a PC tendon,

2) relationship between residual crack widths and member deformation, and

3) quantitative estimation for residual deflection of PRC beams by section analyses.

【Jiro TAKAGI】

【Kazushige YAMAMURA】

Strong Motion Observation of A High-Rise Reinforced Concrete Building

Kazushige YAMAMURA

This study has been conducted from 2008. In this year, the strong motion of "The 2011 off the Pacific coast of Tohoku Earthquake" was observed. The motions of the foreshock, the mainshock, the aftershocks are obtained and analyzed in terms of the natural period. The natural period estimated from the mainshock is longer than the others because of amplitude dependence. There are some cracks of non-structural elements but there seems to be no structural damage as a basis of the natural period.

Collection and Transmission of Disaster Information by Internet

Kauzshige YAMAMURA

From 2005, collection and transmission of disaster information are conducted by the web server using Wiki system. In this year, collection and transmission of three earthquakes are conducted. On "The 2011 off the Pacific coast of Tohoku Earthquake" the web page are made in thirty minutes and collection and transmission are continually conducted. Until the end of March 50,000 accesses are counted by many seismic engineers.

【Susumu MINAMI】

Environmental Engineering

【Noriyoshi ICHIKAWA】

Study on usage of water in consideration of utilization of resources and energy

Noriyoshi ICHIKAWA

This research describes the calculation results of the potential quantity of available water resources in each prefecture. At present, there is only the data of the potential quantity of available water resources which is divided into 14 areas in Japan. It is inadequate discussion about the water resources with a viewpoint from prefecture level, so we adopt new calculation method. We focus on the regional characteristic of potential quantity of available water resources from stochastic method analysis, coefficient of variation and rate of

water resources use. Kagawa, Osaka and Saitama have small amount of the potential quantity of available water resources, large coefficient of variation and high rate of water resources use. This year, we estimate that the possibility of water shortage is high in these prefectures.

Development of Optimal Water Supply System in Buildings

Noriyoshi ICHIKAWA, Hiroshi TAKATA (Hiroshima Univ.), Masayuki MAE (Univ. of Tokyo), Keiko MURO (Ashikaga Institute of Tech.)

Receiving Tank Water Supply system has been adopted in the building which was higher than middle scale. However, Direct Booster Water Spply (DBWS) system method 10 was developed several years ago. Thereafter ten story of DBWS methods became adopt a lot in a building of a class. Recently, Direct Water Supply system is adopted for a building to five story, too. Both water supply method has many advantages, but there are many the problems that you must examine in future. This year, I examined about the construction of the model of the design quantity of water consumption by the estimated maximum value and so on.

A Research of the building equipment education in modern Japan

Noriyoshi ICHIKAWA, Masayuki YAMADA

Environmental problems become focuses in the world, and the concern for the building utility and environmental engineering has increasing especially in an architectural field. In this paper, the transition of the building equipment education in Japanese architectural education field has investigated. From 1886(the 19th year of Meiji), Sanitary engineering has been taught in Teikoku university, which is antecedent of the University of Tokyo, as a lecture of architectonics department. However, the equipment education is usually done in mechanical engineering and the electrical engineering field at that time, it is clear that the equipment education is done from early time as a general inside architectural education field in Japan. One of professors of Teikoku University, Tatsutaro Nakamura was positively related to the establishment of Architectural Institute of Japan, and also endeavored for architectural education in Meiji era. Though information is a little, Nakamura announced a lot of articles and books on an architectural design, the structure, and equipment and it might be a valuable data, and gradually, other professors, engineers, and specialist had grow up. It seems that Nakamura made the route of the building equipment education in architectural field in Japan.

【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 Passive and Low-Energy Architectures which are buildings designed by considering energy conservation and natural energy utilization, it is necessary to clarify the actual performance of them and to establish evaluation

methods for them which are simple and widely acceptable for the public. We have been engaged in the research of these themes.

In this academic year, we mainly carried out following studies and activities.

1. Environmentally Friendly School (Eco-School)

a) Actual Performance of Eco-School; We measured and examined the actual thermal performance of an elementally school opened April in 2009 in Tokyo, which was designed with heat/cool pit, out-side thermal insulation, horizontal louvers and so on.

b) Architectural Standard for School Building; From the results of our studies, we propose "the performance standard" and "the specification standard" for Eco-School building. The performance standard provides the aims of energy consumption and indoor environment and the specification standard provides actual design methods of architecture and building services.

c) Energy Consumption of High Schools in Tokyo; Air conditioning (cooling) system was installed in all classrooms in all metropolitan high schools in 2008. We examined the tendency of energy consumption and the influence of installing cooling systems about all metropolitan high schools (about 200 schools), in order to consider the effective energy conservation methods.

2. Development of Insulated Door at Inside of Window (IDiW)

In last several years we showed that the high thermal performance of IDiW, that is the insulated doors installed at the inside of windows. In this year we examined its summer performance by experimentation using actual house, and also consider the specification and the price by questionnaire survey.

3. Promoting Sustainable Improvement of residential buildings in China

[International Agreement with Northwestern Polytechnical University (NPU), China]

Based on the joint research titled 'Promoting Sustainable Improvement of residential buildings in China', we are considering the improvement methods for the typical residences in the north part (very cold region) and the middle part (cold region) in Shaanxi province. In this year we presented the results of this study at the international conference RE2010. Also, we carried out a simulation study about the thermal insulation method for these two typical houses.

4. Renewal method considering energy conservation and thermal comfort for office building

We examined the effect of change from single glazing to evacuated low-εglazing at the city hall of Mitaka-city in Tokyo, which outside surface is constructed almost with glazing. It is clarified that the high performance glazing and the rise in air-tightness improved greatly the indoor thermal condition and energy consumption in winter.

5. Effect of Home Energy Management System (HEMS)

We examined the effect of HEMS on the energy conservation in detached houses with PV system. From filed measurement and questionnaire survey, it is clarified that the energy consumption of houses that the residents checked the information from HEMS frequently are 10-20 % lower than that of before installing the system.

6. Energy Conservation Performance of Non-Residential Buildings

We carried out a literature survey about the thermal performance and energy consumption of non-residential buildings and clarified its tendencies and problems for each use of buildings in order to improve their energy conservation performance.

7. Other outcome (Appointment)

1) Nobuyuki Sunaga, as the head of a committee of AIJ, edited a book titled "Architectural Environment Book –Find out / Design Bio-climatic Architecture".

2) Nobuyuki Sunaga presented "Role of Architecture Field and ISES/JSES for Sustainable Future" at the ISES's workshop in the international conference RE2010.

3) Nobuyuki Sunaga presented "Outcome and Contribution of AIJ Thermal Environment Field and Urgent Mission for Global environment" at the annual meeting of AIJ.

4) Nobuyuki Sunaga gave lectures about Eco-School at Minamata city, Kumamoto prefecture and so on.

【Akihiro NAGATA】

Uncertainty Modeling of Building Utilization

Akihiro NAGATA

Actual Utilization of buildings is varies a great deal and raises a variety of heat load and energy consumption of buildings. This study aims to develop a method to incorporate this uncertainty into heat load calculations. This year, a diversity of utilization (occupancy, lighting and OA appliance, setpoint temperature and humidity) is measured in a large government office building, a hall, pubs and a fitness club.

Thermal Performance of the Window

Akihiro NAGATA

The thermal performance of the window has been evaluated by laboratory test, but it is very difficult to check for all types of windows because there exists a huge combination of sizes, frames and glazings. For this reason, JIS A2102 which stipulates the calculation method based on ISO 10077 has been published in March 2011. Though the validity of this standard has been roughly confirmed for windows of normal size in Japan, we have few findings for those of smaller or larger than normal size. Thus the thermal performance test of 12 combination cases of four types of frames (aluminum, aluminum resin compound, resin and wood) and three sizes of fixed windows (large size: 1690W×2070H, normal size:1690W×1370H and small size:1690W×570H) was conducted according to JIS A4710. These results were compared with calculated results according to JIS A2102. The measured results correspond to the calculated results for normal size windows with high accuracy. However, the difference between measured and calculated results increases at smaller or larger sizes.

【Satoshi NAKAYAMA】

Strategic Research Center

【Shigeru AOKI】

List of Research Activities in 2010

Architectural Planning/ City Planning

【Jun UENO・Masumi MATSUMOTO】

【Tohru YOSHIKAWA】

1. Refereed Articles

Ryou SANUKI, Tohru YOSHIKAWA and Eiji SATOH

Effect of units for population aggregation on calculation precision of road distance to regional facilities: a case study on municipality subdivision areas in Kanagawa Prefecture

Journal of Architecture, Planning and Environmental Engineering (Transaction of Architectural Institute of Japan), vol.75(658), pp.3011-3019, (Dec.2010) (in Japanese)

Kazuki YANAGISAWA and Tohru YOSHIKAWA

Distance decay in the demand structure of competing regional facilities with capacity

Journal of Architecture, Planning and Environmental Engineering (Transaction of Architectural Institute of Japan), vol.75(657), pp.2579-2587, (Nov.2010) (in Japanese)

Ryou SANUKI and Tohru YOSHIKAWA

A new closedown model of commercial facilities focusing on change in potential of pulling customers: case study on closedown and survival of large-scale electrical appliance store

Journal of the City Planning Institute of Japan, No,45-3, pp.637-642, (Nov.2010) (in Japanese)

Takehiro KONDO and Tohru YOSHIKAWA

Urban models minimizing average travel time by introduction of multistage public transportation system and district centers

Journal of the City Planning Institute of Japan, No,45-3, pp.139-144, (Nov.2010) (in Japanese)

2. Proceedings of Oral Presentations

YOSHIKAWA Tohru

Analysis of Weights of Neighboring Cells in Adjacency Analysis of Land Use Using Grid Data in Terms of Line Segments Crossing Two Squares

Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, F-1, pp.1019-1020, (Sep.2010) (in Japanese)

SANUKI ryou and YOSHIKAWA Tohru

A Study of Aggregation Problem on Distance Distribution by Network Analysis
Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, F-1, pp.1027-1028, (Sep.2010) (in Japanese)

KONDO Takehiro and YOSHIKAWA Tohru
Urban Models Minimizing Average Travel Time by Introduction of Multistage Public Transportation Facilities and Foothold Facilities
Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, F-1, pp.1081-1082, (Sep.2010) (in Japanese)

WADA Tomoharu and YOSHIKAWA Tohru
Optimal Urban Form from the viewpoint of use of natural energy and urban demand for energy
Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, F-1, pp.1083-1084, (Sep.2010) (in Japanese)

HAGA Masakazu and YOSHIKAWA Tohru
A comparison between high-rise apartments and low-rise apartments in consideration of utility of void or height and movement load
Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, F-1, pp.1483-1486, (Sep.2010) (in Japanese)

【Motoki TORIUMI】

【Naoki KUROKAWA】
Naoki KUROKAWA, Annotation upon the Japanese Exhibits at World's Fair, St. Louis, 1904, Summaries of Technical Papers of Annual Meeting, A.I.J., F-2, pp. 205-206, 2010.

Architectural Design and History
【Katsuhiro KOBAYASHI・Akira KINOSHITA】
1. Refereed Articles
NAKANO Yasunori, KOBAYASHI Katsuhiro, MITAMURA Tetsuya
ON LE CORBUSIER'S PLAN TYPES OF "AREDENT"< "FERMES" AND "LINEAR" IN HIS EARLY WORKS
Journal of Architecture and Planning (Transactions of A.I.J), No.651, pp.1125-1132, May 2009 (in Japanese)

2. Proceedings of Oral Presentations

KOBAYASHI Katsuhiro, MITAMURA Tetsuya, KADONO Sho, TKKEMURA Yusuke, MIZUGUCHI Asahiro

Studies on the Architectural Conversion in Spain -Design Method in Conversion from the Viewpoint of Remodeling Degrees –

Summaries of Technical Papers of Annual Meeting, AIJ, pp.831-832 (Sept. 2009) (in Japanese)

TKKEMURA Yusuke, KOBAYASHI Katsuhiro, MITAMURA Tetsuya, KADONO Sho, MIZUGUCHI Asahiro

Studies on the Architectural Conversion in England, Part 1. -Recent Tendencies and Design Method in Conversion from Public, Office and Residential Facilities.-

Summaries of Technical Papers of Annual Meeting, pp.833-834, (Sept. 2009) (in Japanese)

MIZUGUCHI Asahiro, KOBAYASHI Katsuhiro, MITAMURA Tetsuya, KADONO Sho, TKKEMURA Yusuke

Studies on the Architectural Conversion in England, Part 2-Design Method in Conversion from Industrial Facilities-

Summaries of Technical Papers of Annual Meeting, pp.835-836, (Sept. 2009) (in Japanese)

OKAZAKI Shinya, KOBAYASHI Katsuhiro

Composition of Curved Form in Oscar Niemeyer's Works

Summaries of Technical Papers of Annual Meeting, pp.891-892, (Sept. 2009) (in Japanese)

NAKAMURA Takaya, KOBAYASHI Katsuhiro, KITSUTAKA Yoshinori, MATSUZAWA Koichi

Basic Research on Conservation of Concrete Architecture of Ancient Rome

Summaries of Technical Papers of Annual Meeting, pp.225-226, (Sept. 2009) (in Japanese)

MATSUZAWA Koichi, KITSUTAKA Yoshinori, KOBAYASHI Katsuhiro, NAKAMURA Takaya, YOSHIMURA Manabu

Study on Architectural finishing of Ancient Roman Concrete Buildings, Summaries of Technical Papers of Annual Meeting, Japan Society For Finishing Technology, pp.159-162, 2010. (in Japanese)

3. Others

3-2. Research Reports

KOBAYASHI Katsuhiro, et al.

Date Base of Architectural Conversion –Denmark and Sweden (in Japanese)

March 2010

KOBAYASHI Katsuhiro, et al.

Development of Sustainable Improvement of Built Environment in Metropolis

Reported at Kyoiku-kenkyu-koryuukai,Tokyo Metropolitan Univ., Oct. 2010

3-3. Manuals/Reviews

KOBAYASHI Katsuhiro,

Jury Comments, Architectural Prize of Tokyo (in Japanese)

Core Tokyo, Sept.2010

3-4. Works/Products, etc.

KOBAYASHI Katsuhiro, et al

Entry for Desin Competition of Silo Conversion, Korea, May 2010

KOBAYASHI Katsuhiro, et al

Entry for Design Competition of Future Residential Area in Yokohama(First Prize), Dec.2011

【Yukimasa YAMADA】

1. Refereed Papers

Ryuta OHASHI, Tomoharu KATANO, Yukimasa YAMADA

On The Restoration of Historical Churches in Vietnam—The Case of Phat Ngoai Church in Xu Phat Diem—

AIJ Journal of Technology and Design, Vol.16, No.33, pp.757-760, Jun.2010 (in Japanese)

Noriko ITO, Yukimasa YAMADA, Noriyoshi ICHIKAWA

Study on the Building Equipment Education in Modern Japan

Proceeding of The 8th International Symposium on Architectural Interchanges in Asia (ISAIA 2010), pp.501-504, Nov.2010

2. Proceedings of Oral Presentations

Kensuke KOSAKA (Kanazawa City Office), Yukimasa YAMADA

Changing Factors and Setting of Scenery in Temple Ground of TERAMACHI, Kanazawa City, Summaries of Technical Papers of Annual Meeting, A.I.J., F-2, pp.91-92, Sep.2010 (in Japanese)

Noriko ITO, Noriyoshi ICHIKAWA, Yukimasa YAMADA

Relations of Tatsutaro Nakamura and Education of Building Equipment in Modern Japan in Meiji era, Summaries of Technical Papers of Annual Meeting, A.I.J., F-2, pp.429-430, Sep.2010 (in Japanese)

Kaori IWAI, Yukimasa YAMADA

Manner of Arrangement and its Historical Meanings of Catholic Churches in Nagasaki, Summaries of Technical Papers of Annual Meeting, A.I.J., F-2, pp.529-530, Sep.2010 (in Japanese)

Tomoharu KATANO, Yukimasa YAMADA, Ryuta OHASHI (Tokyo Kasei Gakuin Univ.)

Architectural Features and Transformation of Chancel of Phat-Diem Cathedral —Studies on Wooden Catholic Churches in the Northern Vietnam (7), Summaries of Technical Papers of Annual Meeting, A.I.J., F-2, pp.611-612, Sep.2010 (in Japanese)

Li TAO, Yukimasa YAMADA, Tomoharu KATANO

Architectural Features of Chinese Mosques in Ning Xia, Summaries of Technical Papers of Annual Meeting, A.I.J., F-2, pp.637-638, Sep.2010 (in Japanese)

3. Others

3-3. Manuals / Reviews

Yumasa YAMADA

Acceptance and Evolution of Elements from Different Cultures in the History of Islamic Architecture

Collegium Mediterranistarum Monthly, No.332, p.5, Sep.2010 (in Japanese)

【Masao KOIZUMI】

2. Proceedings of Oral Presentation

Methods for Placing Openings in Existing Shear Walls in Wall-type Precast Reinforced Concrete Residential Buildings : Vol.1 Overview and Outline of Research

KADOWAKI Kozo, KOIZUMI Masao, TAKAGI Jiro, KITAYAMA Kazuhiro, MINAMI Susumu, HORI Tomihiro, KAMIBAYASHI Kazuhide, INOKUMA Jun, AIJ, 2010(in Japanese)

Housing and Community for Promotion of Health and Well-Being Part 15 : Elements of Housing for Promotion of Health and Well-Being

KOIZUMI Masao, SEIKE Kiyoshi, NATORI Akira, SHINOZAKI Masahiko, AIJ, 2010(in Japanese)

Housing and Community for Promotion of Health and Well-Being Part 16 : Trend analysis of "The First Housing for Promotion of Health and Well-Being Competition"

NATORI Akira, KOIZUMI Masao, SEIKE Kiyoshi, AIJ, 2010(in Japanese)

3. Others

3－1.Monographs/Technical books

Masao KOIZUMI, House of Environmental Design –Physics and Housing design
Gakugei Syuppansya, 2010

Masao KOIZUMI・Others, IEST: Knowledge of IE(Housing) / Discussion(Web Magazine)
TOSTEM, 2010

3－2. Research Reports

Masao KOIZUMI, Master plan consultation Community Center in Wada, Higashiterakata and the surrounding area, 2010

3－3. Manuals/Reviews

Masao KOIZUMI, Heat-resistant hardened glass with no wire - My-Boka
Nikkei Architecture, Vol.924, Nikkei Business Publications, Inc, pp.24-25,
Apr,26 2010 (in Japanese)

Masao KOIZUMI, Visit recent works "Dr.T House"
Jutaku Tokushu, Vol.291, Shin Kenchiku-sha, p.8, Jul.2010 (in Japanese)

Masao KOIZUMI, Reduction in utility costs coolly, with "ECO"and Coolish
Hanamaru Market(TV Program), Jul.2010 (in Japanese)

Masao KOIZUMI, Development design method in Housing for promotion of Health／ Feature : Research in Housing for promotion of Health
IBEC, No.180, IBEC, pp.21-27, Sep.2010 (in Japanese)

Masao KOIZUMI, Perspective of environment and space design －toward to architecture with ambiguous outline
Jutaku Tokushu, Vol.295, Shin Kenchiku-sha, pp.34-39, Sep.2010 (in Japanese)

Masao KOIZUMI, To import residents' behavior to architectural design
Kentiku Tishiki, No.672, X-knowledge co,ltd, pp.42-43, Nov.2010. (in Japanese)

Masao KOIZUMI and others, Discussion: Beyond homogenous brightness
Nikkei Architecture, Vol.939, Nikkei Business Publications, Inc,
pp.52-57, Nov,22 2011. (in Japanese)

Masao KOIZUMI, others,　Now, there is a chance to invent new things / Evolving image of architect
SDReview 2010, Kajima institute Publishing co.,ltd, pp.57-64, 2010.
(in Japanese)

Masao KOIZUMI, Energy saving house for promotion of Health / Design of Housing
for promotion of Health
Kentikugijutsu, No.732,　Kentikugijutsu, Inc,　pp.150-153, Jan.2011 (in Japanese)

Masao KOIZUMI, others,　Search optimal balance　－Tides of Housing Restoration
through two cases of carbon minus housing
Nikkei Architecture, Vol.939, Nikkei Business Publications, Inc,
pp.52-57, Mar,25 2011. (in Japanese)

3－4.　Works/Products, etc.

Masao KOIZUMI, Toyono integrated compulsory education school, 2010

Masao KOIZUMI, House in Kodaira
Jutaku Tokushu, No.295, Shin Kenchiku-sha, p.6, Nov.2010 (in Japanese)

Masao KOIZUMI, Others, “Gihokuro” Gallery Naya, 2010

Masao KOIZUMI, LCCM Demonstration House
Jutaku Tokushu, No.301, Shin Kenchiku-sha, pp.012-043, May.2011 (in Japanese)

Masao KOIZUMI, ZO-NO-HANA Terrace in Yokohama,
Kanagawa Architecture Competition Award

Masao KOIZUMI, Murai icchi, Chiba City Mihama Health & Welfare Center Culture Hall, Selected Architectural Designs2011, Architectural Institute of Japan, pp.66-67, 2010. (in Japanese)

Masao KOIZUMI, Maebashi Kyoai Gakuen College 1goukan, architectural design proposal: honorable mention

Masao KOIZUMI, multifunctional arena in Fuehuki City, architectural design
proposal: second

Masao KOIZUMI, Dormitory Wakatake in Joetsu City, architectural design proposal: second

【Jun INOKUMA】

【Tomohiko AMEMIYA】

Construction Management and Building Materials

【Seiichi FUKAO】

2. Proceedings of Oral Presentations

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