

## ■ ACMC 2001

As announced in the previous issue of **ICCMC News**, the first version of Asian Concrete Model Code – ACMC 2001 has been published in March 2001 and introduced during the International Conference on Advanced Technologies in Design, Construction and Maintenance of Concrete Structures (ICCMC/IBST 2001) held in Hanoi on 28-29 March 2001. **ACMC 2001 is the first model code for Asia and the first**

**model code that covers all aspects of concrete structures, from materials, design, construction to maintenance.**

The main features of ACMC 2001 are “Performance-based concept” and “Multi-level code structure”. The former specifies performance requirements but not necessarily methods to achieve the requirements. The performance requirements in ACMC 2001 are *serviceability*, *restorability* and *safety*. The “Performance-based concept” makes the codes user-friendly because the performance of structures can be described in non-engineering terms that can be understood by people with no technical background in concrete area. It also makes advanced technology easily adapted into the codes because the methods to achieve the requirements are not specified.

The “Multi-level code structure” in ACMC 2001 consists of Level 1 and Level 2 documents (common code) and Level 3 document (local/specific code). The common code can be applied to any country/region and any type of structure, while the local/specific code can be applied to a particular country/region or particular type of structure. Contents of a Level 3 document, which should conform to those in the Level 1 and Level 2 documents, can reflect local/specific conditions applicable to a particular country/region or structure. ACMC 2001 published in March contains the Level 1 and Level 2 documents. A series of the Level 3 documents are being prepared now and some of them will be available in late 2001.

The “Performance-based concept” and “Multi-level code structure” are adopted to make ACMC 2001 fit with a great diversity in cultural, climatic, technological and economical conditions in Asia.

### Table of contents of ACMC 2001 are as follows:

#### Common Level 1

1. Introduction
2. General Principles for Design
3. General Principles for Construction
4. General Principles for Maintenance

#### Level 2, Part I – Design

1. Design for Actions in Normal Use
2. Design for Wind Actions
3. Design for Seismic Actions
4. Design for Environmental Actions

#### Level 2, Part II – Materials and Construction

1. Scope
2. Essential Requirements
3. Formwork
4. Reinforcement
5. Concrete
6. Prestressed Concrete



#### Level 2, Part III – Maintenance

1. Scope
2. Basis for Maintenance
3. Inspection
4. Deterioration Mechanism and Prediction
5. Remedial Action
6. Records

Copies of ACMC 2001 are available at US\$20/copy through ICCMC members in various countries. For more information please visit <http://www.iccmc.org> or by e-mail [admin@iccmc.org](mailto:admin@iccmc.org).

## ■ ASIAN CONCRETE FORUM

To mark the first JCI annual convention of the 21st century, a special event called “Asian Concrete Forum” in which heads of leading concrete institutions in various Asian countries are invited to attend will be held. ACF is intended to provide an opportunity for key figures in the concrete fields in Asia to get together and learn about the current situations, trends, and problems relating to the concrete world in each other country and to try to find a common practical solution. There is no registration fee for ACF related activities.

ACF will be held 4-5 July 2001 in Sapporo, Japan. For more information visit <http://www.jci-net.or.jp/english/text/acf.htm> or write to [acforum@sapporo.email.ne.jp](mailto:acforum@sapporo.email.ne.jp).



## ■ WELCOME TO CORPORATE MEMBERS

ICCMC welcomes its first corporate members from the following organizations:

Chiyoda Engineering Consultants Co., Ltd  
Denki Kagaku Kogyo Co., Ltd  
Kajima Technical Research Institute  
Nishimatsu Construction Co., Ltd  
NKK  
Obayashi Corporation  
Shimizu Corporation  
Taiheiyo Cement Corporation  
Tobishima Corporation

In addition to becoming a member without voting right, corporate member receives complimentary copies of ICCMC News, latest issue of ACMC, discount on ICCMC level 3 documents, 10-20% rebate on registration fee at ICCMC workshops. For more information about corporate membership, please refer to [www.iccmc.org](http://www.iccmc.org) or write to [admin@iccmc.org](mailto:admin@iccmc.org).

## ■ INTERVIEW WITH ICCMC CHAIRMAN

**Prof Uomoto joined ICCMC in 1994. Despite his busy schedule, he managed to attend all except one of the committee meetings held twice a year in member countries. Prof Uomoto has done everything possible in his capacity to obtain financial support for the committee's activities.**

**ICCMC News:** You joined the committee in 1994, were voted Chairman in 1997 and officially elected Chairman under the constitution in 2000, what, in your opinion, makes you popular among our members?

**Prof Uomoto:** I do not know the reasons and I am interested to know. Maybe because I have been working happily with other members.

**ICCMC News:** It is indeed amazing that throughout these years the committee has been able to operate its business through grants which are often unpredictable. I understand that the committee has introduced "corporate membership" recently and many Japanese companies have already joined. What is the committee's intention behind this introduction?

**Prof Uomoto:** Japanese companies are becoming more aware of the importance of international co-operations, especially co-operations among Asian countries. However, these companies may not wish to support our work by attending our meetings regularly, since their engineers may not have the time to get involved in our mostly academic work.

**ICCMC News:** Now that ACMC 2001 has been published and some countries, such as Vietnam, are developing their national codes based on ACMC, what kind of role do you expect ICCMC to play in helping these countries in developing their own codes?

**Prof Uomoto:** I expect ICCMC to help those countries to develop their national codes by themselves and, if possible, to form a body for Asian engineers to discuss the engineering matters through meetings and symposiums. With the same framework of the codes, we can compare the individual

codes and discuss the differences between them and find the causes of the differences in a more practical manner. These practices may lead ICCMC members to study into the cultures of individual countries of Asia.



**ICCMC News:** ACMC is, frankly speaking, a model code that cannot be directly applied into practical use. I understand that the committee will publish "level 3 documents" for use by practical engineers, how many level 3 documents and for which countries do you plan to publish this year?

**Prof Uomoto:** The most important thing for us at this stage is to produce practical level 3 documents, which are similar to ACI code. For the time being (may be this year), only a few documents can be produced for some countries, such as Vietnam, Indonesia and Japan. I hope a full set of the codes will be produced in the coming years.

**ICCMC News:** Many organizations in various countries have financially supported the publication of ACMC 2001. ICCMC News is in fact printed in Korea and the cost is paid by the Korea Concrete Institute, what role do you expect other Asian countries to play in supporting ICCMC?

**Prof Uomoto:** It is important for us to get financial supports from various countries and industries. If the support is only once off, as in cases of most of donations, the sponsor may not mind much about our activities once they stop supporting. But in cases where the supports are continuous, the

supporters will evaluate our work closely. To get continuous supports, we have to demonstrate to our sponsors and potential sponsors that we are making important contributions to the society, and their support is valuable to us. This is one of the reasons why I initiated the changes in our constitution to allow cooperative membership and also to charge membership fee to our members. Through these changes, I hope ICCMC will be transformed to a more formal and reputed body as in the cases of RILEM, ACI, fib etc.

Any help and support is welcome from our members and organizations through either financial grant or contribution in producing ACMC. We welcome Asian countries to help us produce level 3 documents. We also welcome financial support to help us fund our activities. I think a more important contribution to ICCMC is to produce high level and practical documents. Therefore, I hope the member countries can help us by using the newly developed codes in their engineering practice.

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*UOMOTO Taketo is Director and Professor of International Center for Urban Safety Engineering (ICUS/INCEDE), Institute of Industrial Science, University of Tokyo.*

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During the post-conference trip to Halong Bay on 30 March, Prof Uomoto is flanked by his colleagues. L-R: I Patnaikuni, A Nanayakkara, M A Rahman, T. Uomoto, J Sim and conference keynote speaker, H Wiggerhauser.

## ■ ICCMC/IBST 2001 INT'L CONFERENCE 28-29 March 2001, Hanoi

An International Conference on Advanced Technologies in Design, Construction and Maintenance of Concrete Structures, jointly organized by ICCMC and the Vietnam Institute for Building Science and Technology (IBST) was successfully held at IBST in Hanoi on 28 and 29 March 2001.

Two hundred and seventy concrete experts from research institutes, universities and corporations from 17 countries and some State managers of Vietnam Ministry of Construction, Ministry of Science, Technology and Environment and representatives of construction companies in Vietnam attended the Opening Ceremony. The welcome address was given by Prof Nguyen Van Lien, Vice Minister of Construction, followed by Prof Uomoto Taketo, ICCMC Chairman and A/Prof Nguyen Tien Dich, IBST Director.

Five invited papers were presented during the Plenary session:

### Conceptual design and construction of tall buildings

Prof. Lee Seng-Lip, Professor Emeritus, National University of Singapore, Singapore (and Dr Somsak Swaddiwudhipong, NUS)

### New Japanese structural design provisions towards performance-based design

Prof Shunsuke Otani, University of Tokyo, Japan

### Non-destructive testing and maintenance

Dr Herbert Wigggenhauser, Bundesanstalt fur Materialforschung und-prufung (BAM), Germany

### Concrete model code for 21st century - ACMC 2001

Dr Tamon Ueda, Hokkaido University, Japan

### Peculiarity of concreting pumped concrete mass in the conditions of Vietnam hot humid climate

Dr Nguyen Tien Dich, Institute for Building Science and Technology, Vietnam



Ninety papers were presented in 3 different Technical Sessions:

- Analysis and Design
- Experiment and Construction
- Materials and Maintenance

The conference proceedings containing 95 papers published by the Ministry of Construction Publishing House can be purchased at US\$80/copy. Interested person should contact IBST at [ibsthoa@netnam.org.vn](mailto:ibsthoa@netnam.org.vn).

The conference, held in IBST garden compound, provided an excellent opportunity for experts in concrete fields to exchange their views of common interests in a relaxing atmosphere.



## ■ ICCMC MET IN HANOI

After the ICCMC/IBST 2001 conference, ICCMC met at IBST on 31 March 2001. 20 members and 16 observers attended. The meeting approved a revision of its constitution to accommodate introduction of corporate members and agreed to introduce membership fee for individual and representative members.

Two level 3 documents were approved for publication, one of which is presented briefly on page 4 of this ICCMC News.

## ■ REPORT FROM MALAYSIA

The British Standards in use now for design of concrete structures in Malaysia will be phased out by the year 2006, i.e. when UK plans to adopt or adapt the Eurocode. Many local engineering institutions and practicing engineers in Malaysia are in a dilemma. Should they follow the British move or should they stick to the existing BS codes or to adopt alternative codes of practice?

The Institute of Engineers Malaysia (IEM) held a forum in November 2000 among local practicing engineers to gauge their response to this new development, and most of the engineers present seemed to agree to adopt the Eurocode.

Although ACMC and ICCMC activities were introduced by the author during CONCET 1999 Conference organized jointly by IEM, Universiti Malaya and Universiti Teknologi Mara and during talks and seminars on Asiar Concrete Code Development organized by IEM, **it is of utmost importance that Malaysian engineers are made aware of ACMC as a viable alternative**

The author has been appointed Secretary of IEM Taskforce on Issues Related to Codes of Practice in the Construction Industry after 2006 in which not only ACMC but also other international codes of practices such as Eurocode, ACI, and Australian Standards will be evaluated for possible adoption. He is working towards a plan to hold a technical meeting and a series of seminars on ACMC in Kuala Lumpur, Malaysia sometime in mid-December 2001. It is hoped that more Malaysian engineers will then take notice of the merits of ACMC as a viable alternative to other codes of practice after 2006.

*The author, Jeffrey CHIANG, is a Lecturer at Monash University Malaysia.*

## ■ JOINT MEETING WITH APEC TG1 AND INFORMAL NETWORK

On the evening of 27 March, ICCMC members met with members of the APEC Technical Group 1 and the Informal Network to discuss possible collaboration between the 3 groups.

## SEISMIC PERFORMANCE EXAMINATION FOR RC BUILDING DESIGNED ACCORDING TO THE ARCHITECTURAL INSTITUTE OF JAPAN (AIJ) GUIDELINES

The full text of this guideline will be printed as a level 3 document in July 2001. It is one of the series of level 3 documents to be published by ICCMC.

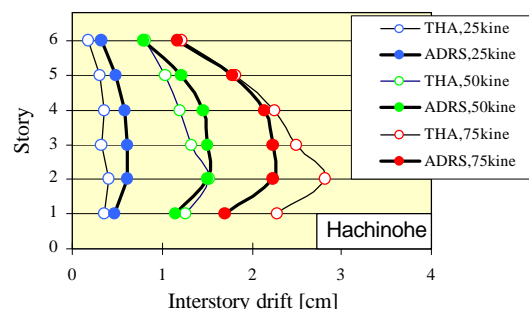
This document describes the procedure to examine the seismic performance of a reinforced concrete building subjected to earthquake motions with the intensity level specified for each of the Serviceability, Damage Control and Ultimate Limit States. The building this document is applied shall be designed according to the AIJ Structural Design Guidelines for Reinforced Concrete Buildings. The basic concept of the Guidelines is such that a building shall be designed on the basis of Weak-Beam and Strong-Column Concept which is intended to result in the formation of total yield mechanism. The procedure for the performance examination is presented using a six-story example building for the sake of better understanding.

Interstory drift of the building is used as performance index. And limit interstory drift,  $PI_P$ , is tentatively determined as 0.5%, 1.0% and 2.0% of each story height, respectively for the three limit states. The intensity levels of earthquakes are so determined that the maximum velocity of motions is to be 25, 50 and 75kine (cm/sec.), respectively for the Minor-to-Moderate, Severe and Ultimate Earthquakes. In Japan, the maximum velocity of 25 and 50kine are often considered as levels representing the Minor-to-Moderate and Severe Earthquakes in the design of high-rise buildings with the total height more than 60 m. The maximum velocity for the Ultimate Earthquake is tentatively determined to be 1.5 times as much as that for the Severe Earthquake.

The nonlinear pushover analysis is carried out to compute the relations between base shear and roof floor displacement of the building or capacity curve. Then the capacity curve is converted to the relations between spectral acceleration and spectral displacement of a SDOF system. These relations are referred to as Capacity Spectrum. On the other hand, two earthquake records are considered as earthquake motions in this documents. They are, 1940 El Centro record, NS component (USA) and 1968 Hachinohe record, NS component (Japan). And Acceleration and Displacement Response Spectra (ADRS) are computed for the given intensity levels.

The performance point (maximum response) of the building is determined as an intersection of Capacity Spectrum and ADRS using a graphical solution which is typical trial and error analysis. Such procedure is called as ADRS method or Capacity Spectrum method. The computed interstory drifts for the Hachinohe record are shown in the figure. The seismic performance is examined by comparing limit interstory drift,  $PI_P$  and computed interstory drift,  $PI_R$ . It can be seen that the computed interstory drift for each case remain within the limit interstory drift, 1.75cm (0.5%), 3.5cm (1.0%) and 7.0cm (2.0%) respectively for the three limit states

The nonlinear Time History Analysis (THA) is done for reference. The results from THA are also shown in the figure. It is observed that the two results are in fairly good agreement.



The author, YOSHIMURA Manabu, is a professor at Department of Architecture, Tokyo Metropolitan University and AIJ's representative member on ICCMC.

## VIETNAM NATIONAL CODE FOR MAINTENANCE

In order to develop a Vietnam National Code for Maintenance based on ACMC, a joint project was set up between IBST and ICCMC in August 2000. At the meeting in Hanoi on 31 March 2001, a progress report including detailed content and implementation schedule was made by Prof Ekasit Limsuwan, ICCMC team leader, and Dr Le Quang Hung, IBST team member. It is expected that the Code will be completed and submitted to the Vietnam Ministry of Construction for approval in September 2002. The Code will be applicable to concrete structures of building and industrial works.

This is the first joint project between ICCMC and its member country in developing a National Code as a level 3 document of ACMC.

## FUTURE ICCMC MEETINGS

July 2001	Sapporo, Japan
December 2001	Malaysia



ICCMC News is published every six months by the Int'l Committee on Concrete Model Code. For further information about the committee activities, please refer to <http://www.iccmc.org/> or write to [admin@iccmc.org](mailto:admin@iccmc.org)

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