

## 13<sup>th</sup> World Conference on Earthquake Engineering

The 13<sup>th</sup> World Conference on Earthquake Engineering was held during August 1-6, 2004 at Vancouver, Canada. It was hosted by the Canadian Association for Earthquake Engineering under the auspices of the International Association for Earthquake Engineering (IAEE).

Since 1956, the world conference on earthquake engineering is being held once in four years. The earlier conferences were held at Berkeley, USA in 1956; Tokyo and Kyoto, Japan in 1960; Wellington and Auckland, New Zealand in 1965; Santiago, Chile in 1969; Rome, Italy in 1972; New Delhi, India in 1977; Istanbul, Turkey in 1980; San Francisco, USA in 1984; Tokyo and Kyoto in 1988; Madrid, Spain in 1992; Acapulco, Mexico in 1996; and Auckland, New Zealand in 2000.

The world conference on earthquake engineering presented an arena for scientists, engineers, industrial professionals, and government officials to present their discoveries, scientific and engineering works, to exchange ideas and knowledge to mitigate seismic risk. It also provided a platform to delegates from all over the world to initiate new co-operation, to revive new interests, to make new friendships, and to renew old acquaintances. World conference also proved to be the occasion for holding a number of important international meetings related to earthquake engineering.

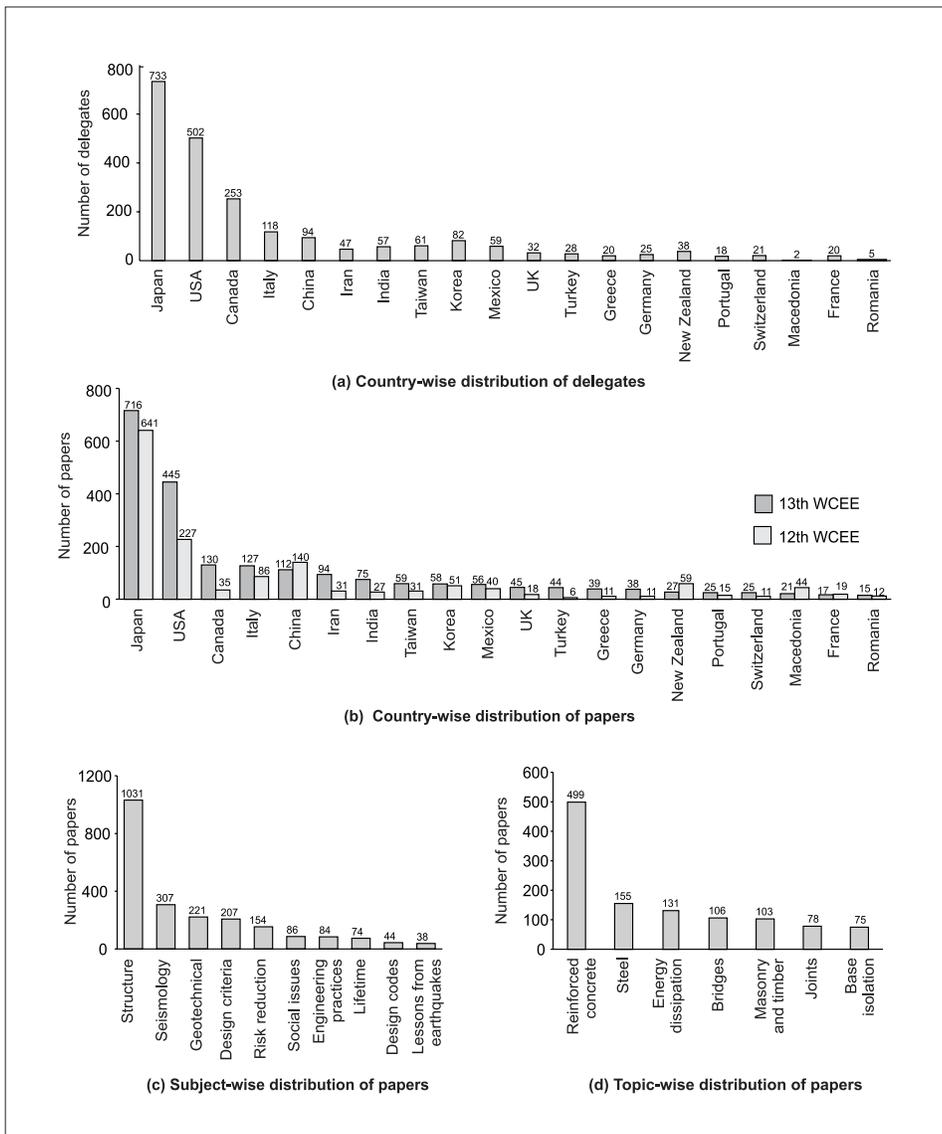
The 13<sup>th</sup> world conference was attended by about 2500 delegates from about 73 countries. In this conference, approximately 2300 technical papers were included in the conference proceeding of which about 700 were oral presentations and remaining were poster presentations. The proceedings of the conference are available in the form of CD-ROM and DVD, which contain all the technical papers. These 2300 technical papers are contained in approximately 27,000 pages. A handbook containing technical programme of the conference and title of papers along with authors' name is also provided to all the participants.

Each day began with two (or three) keynote lectures of 45 minutes each followed by technical sessions. Totally, eleven keynote lectures were delivered by well known experts from all over the world. These keynote presentations provided a broad overview of the latest developments in a wide range of topics from seismology to performance-based design approach to seismic risk mitigation. Performance-based design was the subject in four keynote lectures while two lectures were devoted to lifeline engineering. In one of the keynote lectures, earthquake engineering developments in China were described and another one discussed the steps taken in Japan towards earthquake risk mitigation since Kobe earthquake of 1995. Technical oral presentations were arranged in about nine parallel sessions and posters were displayed in a large exhibition hall. Daily

about 350 posters were displayed and extended lunch and coffee breaks were provided to facilitate delegates to visit posters of their interest and interact with the authors.

A number of other meetings held during the conference include those of the Board of Editors of the World Housing Encyclopedia ([www.world-housing.net](http://www.world-housing.net)); of the Board of Directors of the World Seismic Safety Initiative ([www.wssi.org](http://www.wssi.org)), and of the Board of Directors of the International Association for Earthquake Engineering ([www.iaee.or.jp](http://www.iaee.or.jp)). There was also a special evening session to discuss the World Housing Encyclopedia project of the Earthquake Engineering Research Institute (EERI) and the IAEE.

The papers on topics relating to structural engineering constituted about 40 percent of all the technical submissions followed by papers in the area of seismology and geotechnical engineering. Interestingly, there were large number of technical subjects like design criteria, design codes, and engineering practices. Steel structures appear to attract less studies as compared to seismic behaviour of reinforced concrete structures. Masonry and timber structures have received considerable attention and on this topic papers from all the major countries were presented. Seismic response control techniques continued to draw the attention of earthquake engineering community. In addition to base isolation



**Fig 1 Details of the papers presented and delegates**

technique, passive control devices such as viscous dampers, metallic dampers, and friction dampers were discussed in many papers. Countries like Japan and USA are increasingly using passive control devices to mitigate seismic risk. Japan Society of Seismic Isolation (JSSI) has prepared a manual<sup>1</sup> for "Design and Construction of Passively Controlled Buildings" details of which were presented in this conference through a series of twelve papers.

Apart from technical sessions on major topics, some special theme sessions were also presented on topics as: future of building codes, indigenous earthquake-resistant technologies, seismic response of irregular structures, and centrifuge-based liquefaction studies. Issues associated with

seismic risk reduction in developing countries, especially in the context of urban built environment, were also discussed and debated. Regulatory issues were also discussed and participants from many countries shared their experiences. Performance-based design approach has now gained sufficiently wide acceptance. Next generation codes will be using performance-based design approach and it is expected that seismic hazard for acceptable performance level will be quantified in terms of the amount of money for repair (dollars), time available for repair (downtime), and number of casualties (deaths).

In some brief presentations, delegates were also informed about important

developments in the area of seismic risk mitigation. In one such presentation, Prof Haresh Shah briefed about activities of World Seismic Safety Initiative (WSSI) in developing countries. Through statistical data he showed that developing nations continue to suffer heavy damages and casualties during earthquakes. He emphasised that the earthquake community needs to critically examine ways to make seismic mitigation efforts more effective in these countries.

A number of presentees and delegates participated in the 13<sup>th</sup> WCEE from across the globe — from countries such as Japan, USA, Canada, Italy, China, Iran, India, Taiwan, Korea, Mexico, UK, Germany, France, etc. Compared to only 9 Indian delegates in the last world conference held at New Zealand in 2000, about 60 Indian delegates attended the world conference this time<sup>2</sup>. About 75 technical papers from India were included in the proceedings of the conference this time as compared to only about 27 papers in the last world conference. This clearly shows that India has made rapid progress during the intervening four years. This can be attributed to two main reasons: the 2001 Bhuj earthquake has created an unprecedented level of interest in the subject within the country, and the National Programme on Earthquake Engineering Education (NPEEE) has helped enthuse a large number of faculty members of colleges about the subject (and in fact, NPEEE helped partially support a large number of Indian participants in the conference). However, India remains far behind in terms of research in earthquake engineering, as can be seen from the quality of papers, from the publication record in the international journals, and from the fact that very little research work is being carried out on problems of direct relevance to earthquake safety in India. Particularly alarming is the fact that the research infrastructure in terms of laboratory facilities in India is generally stagnant in earthquake engineering while other countries are making very rapid progress.

Amongst the Indian delegates, there were four practising engineers/architects — one official from Department of Science

& Technology, one engineer from Government of Haryana, one employee of UNDP, and the rest were teachers from various academic institutes. From the seven IITs and IISc Bangalore, there were about 30 participants including some PhD students.

Prof Ravi Sinha of the Indian Institute of Technology (IIT) Bombay chaired a technical session and Prof Sudhir K Jain of IIT Kanpur chaired a keynote plenary session. Prof Jain was also re-elected on the board of directors of the International Association for Earthquake Engineering for the next four years.

An informal lunch meeting was organised during the conference for delegates from India and those who consider themselves "friends of India". About 60 persons attended the meeting including several participants from outside India — the prominent ones being Prof Haresh Shah of Stanford University, Professor Anil Chopra of the University of California at Berkeley, and Prof Andy Veletsos of Rice University. The participants in the meeting were very enthusiastic about the current earthquake engineering scenario in the country. Prof Chopra praised the efforts made by government, academic institutes and other agencies in India

towards seismic risk reduction. He opined that such a significant improvement in the number of Indian delegates is a clear indication that India has made substantial progress in the last four years. Professor Shah emphasised that India should now become a "giver" rather than a "taker" in the field of earthquake engineering, and should assist other countries where earthquake engineering is not as well developed as in India. Lively discussions took place on many aspects of earthquake engineering specific to India, for instance, about the lack of systems in India to ensure that scientific data is systematically shared which is hampering the quality of research as well as tasks such as seismic microzonation.

The International Association for Earthquake Engineering consists of 56 member countries at present. During the conference, four countries (India, China, Chinese Taiwan, and France) made offers to host the next world conference in 2008. The voting by 45 member countries present went in favour of the Chinese offer.

On the whole, the conference was extremely well organised and provided an excellent opportunity for Indian delegates to get a world-view of the recent developments. It was also an opportunity

for introspection; clearly, India needs new initiatives and programmes to develop a strong and a vibrant earthquake engineering research programme in numerous institutions wherein many problems relevant to Indian construction types can be taken up. This requires a concerted effort along the lines of National Programme on Earthquake Engineering Education, and substantial inputs into the research infrastructure.

### References

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2. RAI, D.C. and JAIN, S.K. 12<sup>th</sup> World conference on earthquake engineering, Auckland, New Zealand, *The Indian Concrete Journal*, April 2000, Vol. 74 No. 4, pp. 217-218.

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