

AEES Newsletter 3/98

The Editor AEES Newsletter
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President's Perambulations

The Society operates as a Technical Society of the Institution of Engineers, Australia. It aims to promote the practice of earthquake engineering and engineering seismology. At the first meeting of the new executive on 26 November 1998 we discussed how we might best achieve this aim - a standard question for a new committee but with no standard answer. Two avenues we would like to push are:

- have more members (and others) contributing to the newsletter.
Kevin McCue has done a sterling job with the newsletter since the Society's inception and has agreed to continue in this role, for which I thank him most sincerely. I encourage you to support him by writing short notes about recent and current activities so that the newsletter serves as a forum for keeping in touch.
- seek to have articles, letters etc. published in Engineers Australia so that the wider membership of the Institution is made aware of our activities and contributions.

I will conclude this first walkabout with some personal details (establishing my credentials as it were). I am employed as a Principal Engineer with Kinhill Pty Ltd, a large Australian consultancy owned by Halliburton of USA. My early contact with earthquake engineering occurred in 1968 when I took up a lecturing position at the Papua New Guinea University of Technology in Lae.

The late Professor John Lavery, University of Queensland, pointed out that it was a ready-made laboratory for earthquake engineering. Among other things I was co-opted to the Australian National Committee which prepared the draft of the document which eventually became AS2121. I also served on the committee which produced the present earthquake loading code AS1170.4. My background is in Civil and Structural Engineering and I have designed many structures for earthquake effects as well as carrying out seismic hazard studies to determine appropriate levels of loading for structures in remote locations.

Enough of my personal stuff. I wish you the compliments of the season and look forward to serving you over the coming months.

Bill Boyce

Your Society - AEES

Executive:

President: Bill Boyce (Kinhill Pty Ltd, Brisbane, Qld)
Secretary: Russell Cuthbertson (QUAKES, University of Queensland)
Treasurer: Dr Steven Jaume (QUAKES, University of Queensland)
Imm Past Pres: Prof Graham Hutchinson (Civil & Environmental Engineering, Melbourne Uni)

Secretariat:

Barbara Butler (Civil & Environmental Engineering, Melbourne Uni)

Committee:

John Wilson (Vic)
Col Lynam (Qld)
Peter Gregson (WA)
Vagn Jensen (Tas)
Michael Neville (NSW)
Dr Mike Griffith (SA)
Kevin McCue (ACT)

The Society Website/email list

Dear AEES Members,

The fledgling AEES web site is up and running at "<http://www.aees.org.au>".

We are looking for suggestions on things to be included such as:

- copies of the newsletter
- details about relevant up coming conferences
- details of interesting recent publications
- significant research projects in earthquake engineering (in Australia?)
- links to other relevant Web sites

What do you think of these ideas?

What other things do you think could be included?

Does anyone out there have an interest in contributing to the development of the Web site (there are very easy-to-use tools available for this)?

Send ideas email to "vaughan@seis.com.au"

Cheers, Vaughan Wesson

THE 1998 AEES AGM - PERTH WA 4 November 1998

Meeting opened 5.00 P.M.

Present: Ben Miliauskas, David Sinai, Nelson Lam, Steven Jaume, Gary Gibson, Amy Brown, Ed Paul, Barb Butler, Russell Cuthbertson, Vagn Jensen, Michael Neville, Peter Gow, Peter Gregson, Kevin McCue, Charles Bubb, Trevor Jones, David Love, Colin McIvor, Graham Hutchinson, John Wilson, Vaughan Wesson.

1. Welcome and Apologies

Graham Hutchinson welcomed members to the 1998 AGM. Apologies were received from George Walker and Bill Boyce.

2. Minutes of the 1997 AGM

These had been circulated in the newsletter and were accepted as an accurate record of the meeting.

3. Treasurers Report

Read by John Wilson

A motion of thanks was passed to the organisers of the previous meeting in Brisbane - both the conference and AGM.

A motion of thanks was passed to Barb Butler for her good work over the previous year.

4. President's Report

The report are contained in each newsletter.

5. Newsletter Report

Three Newsletters were distributed during the year. Kevin McCue indicated that all/any contributions to the newsletter were welcome. Perhaps a list of possible types of article could be printed to prompt people into action.

6. Web Site Report

The AEES applied for the domain name "aees.org.au" in June and this was granted on Monday 2 November, two days before the AGM. This will enable the Society to set up and operate its own Web site, which will be at "www.aees.org.au". Any suggestions for content for this site should be sent to Vaughan Wesson "vaughan@seis.com.au".

Vaughan Wesson also reminded members that the AEES had set up an email list earlier this year for all members. The idea of the list is to foster discussion on issues in Earthquake Engineering, particularly in Australia (see page 1).

7. Next Meeting

The suggestion was put that the next meeting and AGM should be held in Newcastle in 1999 as this is the 10 year anniversary of the Newcastle earthquake. This was agreed to.

8. WCEE Auckland

In February 2000, the WCEE is being held in Auckland. There was some discussion as to whether a separate AEES meeting should be held that year (The annual seminar was rolled into the PCEE in Melbourne in 1995 - Ed). At the very least an AGM will need to be held.

9. Election of new Executive

Graham Hutchinson moved a motion that Executive members of the society be able to occupy their position for no more than three consecutive years. This is to ensure a rotation of the Executive positions. The motion was seconded by John Wilson and passed by a vote of members.

The following positions were filled unopposed:

- President - Bill Boyce
- Secretary - Russell Cuthbertson
- Treasurer - Steven Jaume

The state representatives for the next year will be:

- Qld - Col Lynam
- NSW - Michael Neville
- Vic - John Wilson
- Tas - Vagn Jensen
- ACT - Kevin McCue
- SA - Mike Griffith
- WA - Peter Gregson

The newsletter editor remains Kevin McCue and the AEES Webmaster is Vaughan Wesson.

10. Other Business

a) Kevin McCue suggested that the Society set up a number of technical sub-committees to study in some detail significant topics in Earthquake Engineering. In particular, he proposed the following two sub-committees which he volunteered to chair:

- A sub-committee to investigate the definition of a revised intensity scale for Australia.
- A sub-committee to study the probability of significant aftershocks following a damaging main shock to assist emergency services personnel.

The motion was carried.

Gary Gibson brought up the subject of a register of people to be mobilised for post earthquake activities. This has been discussed by the Society before but no firm action has yet been taken. He mentioned that the EERI have a form for people to indicate their area of expertise which could be used as the basis for one for the Society. It was agreed that this should be organised on a State basis to ensure liaison with the State Emergency Service and Minister.

It was agreed that a letter would be sent from the AEES to the various State Ministers. Michael Neville noted that NSW already has a similar registry.

A motion of thanks was presented to the outgoing Executive for their work over the previous year.

The meeting closed at 5:25 P.M.

Report of the 1998 Perth Seminar

Some of the 75 odd registrants, about 33 from interstate, thought that this was the best AEES Seminar to date. It certainly covered a good mix of earthquake engineering, seismology, emergency management and insurance issues. Most people stayed throughout the sessions to hear papers that were not in their discipline.

The State Minister of Emergency Services, Kevin Prince opened the Seminar with a very personal and scintillating speech. Amongst other things he wished us well, declared his ongoing interest in our deliberations and noted that WASES was the agency responsible for earthquake matters in WA. We hope to bring you his speech in the next Newsletter.

It was disappointing that keynote speaker Dr Paul Somerville was unable to make it from Los Angeles following a surfing accident but Andrew King from BRANZ New Zealand more than compensated with a stimulating discussion of future directions for loading codes which complemented Charles Bubb's more retrospective view of the development and philosophy underpinning the modern code.

The Proceedings were distributed at registration thanks to a sterling effort by the organising committee and Barbara Butler (and most of the speakers). There are a few extra Proceedings available but this year fewer copies were printed. Rather than try to summarise the papers we will publish some of them in future editions of this Newsletter and I understand that some will also be published in the Bulletin of the New Zealand National Society for Earthquake Engineering.

Conference Dinner

The dinner was held at the 'Moorings' on Barrack Street Jetty just a pleasant walk down to the river from our hotels around the conference venue in the city. The ambience on the dock overlooking the Swan River at sunset was great until the 'Fremantle doctor' finally drove those early arrivals inside who had been enjoying a quiet pre-dinner ale.

The only formal interruption to the delightful meal was the presentation of life membership to Charles Bubb by Graham Hutchinson in a brief but touching ceremony.

The social fireflies moved around from table to table during the dinner but the early morning presenters next day were keenly aware of the time and left relatively early.

The menu has already been forgotten but the locale, the company of AEES members and their partners ensured a most memorable night.

Charles Bubb - First Life Member of AEES



Charles Bubb at AEES Seminar Perth

It is very satisfying to see achievement rewarded, in this case half a lifetime and effort spent on the timely development of earthquake engineering and engineering seismology in Australia. Charles as Director of Engineering at ComWorks (for Australia and PNG) was blessed with good timing, the 1968 Meckering earthquake which awakened his attitude to the threat of earthquakes in Australia and the 1989 Newcastle earthquake which enabled him to influence non-believers. Graham briefly mentioned Charles' role in developing and applying the first Australian Earthquake Code after Meckering, his initiative to establish the AEES after the Newcastle earthquake and to link it to IEAust, and his role as National delegate to the IAEE. Graham then presented Charles with a certificate, specially crafted by Barbara Butler, of life membership.

Report on the Meckering Excursion:

A mini bus load of members and friends hosted by Peter Gow and Peter Gregson undertook the excursion on 16 October to Meckering, Northam and York to inspect the 1968 earthquake fault scarp, earthquake museum and AGSO's Mundaring Observatory.

We briefly inspected the Northam Hospital, tallest and largest building in the wheat belt which was under construction at the time of the earthquake and which has now closed, partly as a result of the

perceived earthquake hazard. It is a 'T' shaped concrete frame building with infill masonry walls. Many of the graceful old buildings in Northam and York inexplicably escaped damage despite their tall gables and elaborate parapets.

The fault scarp itself has virtually been obliterated by ploughing and weathering apart from a fenced off section by the highway. A photographic museum in Meckering had some spectacular photographs which we will include in this Newsletter from time to time.

The visit to the Mundaring Geophysical Observatory was fortuitous for those in the party as AGSO has since decided to close the Observatory in the year 2000 following the announced retirement of long term OIC Peter Gregson.

The Aitape PNG Earthquake and Tsunami - an update

Tsunamis are certainly in the news of late, an alert for the NW shelf of WA was issued by the Australian Tsunami Warning Service on 29 November following a Ms 7.6 earthquake in Indonesia's Molucca Sea. The earthquake was the second largest of 1998 and caused widespread damage but apparently no tsunami and the alert was cancelled when the tide gauge at Darwin revealed no anomalous waves.

A report of the 17 July earthquake near Aitape Papua New Guinea appeared in the last Newsletter. Since that time there has been a special session of the AGU devoted to the earthquake and tsunami and arrangements made for a marine survey. The "Kairei", a deep sea research vessel belonging to the Japan Marine Science and Technology Center (JAMSTEC) in Yokosuka, will run swathe mapping over the offshore source area in January with the aim of detecting evidence of faulting or landslides.

This study will, it is hoped, answer the question posed in the last Newsletter: 'Was it a special slip source, a freakish seafloor topography or a submarine landslide that caused PNG's largest tsunami and worst natural disaster in recorded history?' Ian Everingham had clearly documented previous tsunamis in the region which had not been so destructive.

A report by AGSO and PNG'S seismologists on the aftershock analysis has been submitted to AusAID for consideration.

Reference: Everingham, I.B., 1970 Tsunamis in the Papua New Guinea Region, 1888 - 1973. BMR Report.

NUGGETS FROM THE NEWSGROUP -

A REGULAR FEATURE BY CHARLES BUBB

Another intraplate earthquake: Pymatuning USA September 25, 1998

Origin time: 19:52:52 (UTC); 3:52:52 p.m. (EDT)

Latitude: 41.47N, Longitude: 80.48W

Magnitude: 5.0mb; 5.2Lg, Depth: 7.0 km

Geographic location: Between Jamestown, Mercer County, Pennsylvania and the Ohio border, at the southern end of Pymatuning Reservoir; about 28 miles NE of Youngstown, Ohio.

A moderate earthquake centered near Jamestown, Pennsylvania, on the Mercer County-Crawford County (PA) line, at the southern end of Pymatuning Reservoir and just east of the Ohio border, shook a multistate area from Wisconsin to New Jersey late Friday afternoon, September 25, 1998. Shaking was greatest in Ohio, Pennsylvania, Michigan, New York, and Ontario. The event was recorded on seismographs as far away as Mongolia. Preliminary analysis suggests that the earthquake occurred along a NW-SE trending fault. This trend is similar to known faults in Ohio located south and southwest of the

epicentral area.

Damage reports are incomplete at this time, but preliminary information indicates that damage was light, consisting of broken dishes and a few damaged chimneys in the epicentral area. Dr. John Armbruster, of Lamont-Dougherty Earth Observatory, reporting from the epicentral area, observed that the highest intensities were in Jamestown and Greenville, Pennsylvania. Chimney and plaster damage was noted in Greenville and merchandise was knocked off store shelves in Greenville and Jamestown. Maximum peak Modified Mercalli Intensity was VI. The National Earthquake Information Center of the U.S. Geological Survey, with the assistance of the Ohio Geological Survey, is compiling felt reports and will construct an isoseismal map of the event.

The U.S. Geological Survey, Memphis State University, and Lamont-Dougherty Earth Observatory deployed 12 portable seismographs in the epicentral area by noon, Saturday, September 26, in order to record aftershocks. As of September 30, no aftershocks had been detected. At least some of these instruments will be deployed for about a month. The current epicentral location is probably accurate to only about 5 to 15 km because of the distance of seismographs from the event. If an aftershock sequence occurs, the epicenter will be located much more precisely by the portable instruments.

The earthquake was recorded by seismic stations at the College of Wooster and at the University of Toledo, in Ohio, and at a number of out-of-state stations, including the University of Michigan. Analysis of the seismograms by Harvard University indicates that the most likely fault-plane solution is a northwest-southeast oriented fault (strike, 303 degrees). Movement on the fault, according to analysis by Michigan State University, was a thrust with a small left-lateral component. Although no fault has been mapped in this epicentral area by either the Ohio or Pennsylvania Geological Surveys, this orientation is similar to that of a series of subsurface faults to the south in Columbiana, Mahoning, and Portage Counties, Ohio and to the north in Crawford county, Pennsylvania.

Three small earthquakes were previously known from the general epicentral area of the September 25, 1998 event. A small earthquake with a Modified Mercalli Intensity (MMI) of III occurred on August 17, 1873, and was assigned an epicenter at Sharon, Mercer County, Pennsylvania. Another historic event occurred on August 26, 1936, at Greenville, Mercer County, Pennsylvania and had an MMI of III. An instrumentally located event, with a magnitude of 3.2, occurred on April 14, 1985, at Conneaut Lake, in Crawford County, Pennsylvania. These minor historic events did not suggest that this area of northwestern Pennsylvania was capable of generating a 5-magnitude earthquake.

The Pymatuning earthquake will be the subject of additional study in the coming weeks as seismograph records are analyzed, felt-area reports are compiled, and basement-rock structure is studied. Each event such as this one provides valuable information on crustal structures beneath Ohio and adjacent areas and further increases our ability to evaluate seismic risk and deep geologic framework.

Links with information about the Pymatuning earthquake:

www.geology.utoledo.edu/research/geophysics/UTO/UTO.html

www.wooster.edu/news/seismic/seismic.html

www.geo.lsa.umich.edu/MichSeis/index.html

Charles

Proposed Structural Design Standard

by **Richard Weller**

The General Design Requirements and Loading on Structures Committee, BD/6, are at present revising the loading standards for Australia and New Zealand with the aim of producing a new joint standard.

There will be a new standard dealing with those things of a general nature (including for example the load combinations), while the loading parts will only include requirements specific to the loads that are covered.

It is planned to issue the general requirements and the dead and live load parts for public comment around the end of this year. The new General Requirements Standard is based on the principles described in ISO 2394 General Principles on Reliability for Structures which is a newly prepared guide for the drafting of such standards.

This new standard will cover the process of design from the choosing of a structure's performance level through the identifying of load situations, calculation of load combinations and analysis of the structures behaviour to the verification of the designed structure by checking the limit states. This standard will call up the loading standards and require the use of a materials design standard in order to completely cover the entire process of structural design.

The important new part of this standard is the establishment of performance categories. This is based on a matrix of performance categories, (A, B, C), entered by choosing a reference period (design life) and a structure type (importance level). The categories are then linked directly to a load level that represents a particular annual probability of exceedance of load. The loading standards will then provide a range of load levels and the one appropriate to the performance category is used for the design.

This allows enough flexibility for the design of structures such as dams through to non-habitable or seldom used structures with the appropriate level of reliability and is a response by the committee to the implementation of the ISO Standard.

The dead and live loadings are also being revised with some important changes for live loads. Live loads will be presented in a format similar to the European code, (reflected also in the British code), with loads given for types of usage and some examples of specific types of occupancy as subheadings. Balustrades will be given in a similar format with four levels of loading for design.

Each part of the existing loading code will be withdrawn a year after the publication of its replacement and the general requirements will be compatible with the existing loading codes until they are withdrawn.

Committee BD/6: General Design Requirements and Loading on Structures

Chairman: Greg Reardon

Projects Manager: Richard Weller

Subscriptions

The AEES subscription year is from 1 Dec to 30 November. It is difficult and expensive to send each member an individual reminder that fees are due so please help us by sending your subscription for 1997/98 to AEES (attn: Barbara Butler, Civil and Environmental Engineering Dept, Melbourne University Parkville Vic 3052) or renew through IEAust's annual subscription system by marking AEES your preferred Society. If you change address or if you know a member who is not receiving the newsletter please advise the Secretary, many newsletters are returned.

11th European Conference on Earthquake Engineering (Paris, France)

We were fortunate to receive two accounts of the conference from Mike Griffith and Cvetan

Sinadinovski so we are publishing both though I have included just the one conference layout. The themes and coordinators were as follows:

T1 - Engineering seismology : seismicity, strong ground motion. B. MOHAMMADIOUN/N. AMBRASEYS

T2 - Soils, rocks, construction, material: experimental aspects. J.G. SIEFFERT

T3 - Constitutive relations, linear and non-linear modeling, computational aspects for materials, structures and soil-structure interaction. F. DARVE

T4 - Civil engineering projects. J. COMBAULT

T5 - Active and passive isolation. J. BETBEDER-MATIBET

T6 - Industrial facilities, lifelines, equipment. P. SOLLOGOUB

T7 - Vulnerability, seismic risk, strengthening. M. BOUCHON

T8 - Site effects, spatial variability of seismic motion. P.Y. BARD

T9 - Reliability analysis, probabilistic aspects. R.J. GIBERT

T10 - State of the art: seismic capacity design, design criteria, codes and standards. V. DAVIDOVICI

SPECIAL THEMES

TS1 - Eurocode 8 and national applications. Ph. BISCH

TS2 - Seismic risk in the Mediterranean Basin. J.P. MENEROUD

TS3 - Post-earthquake investigations and feedback experience. C. BOUTIN

Report by Dr Cvetan Sinadinovski

The Conference provided a forum for scientists and engineers from Europe and other countries to discuss various aspects of earthquake engineering. It was divided up into ten major topics and three special topics selected by the Organising Committee. For each topic a coordinator was named who, helped by a member of the Scientific Committee, was in charge of organising the review of papers by the International Scientific Committee and of choosing the form of each session in the topic.

In order to facilitate exchanges and discussions, the number of traditional oral sessions was limited. Organisation of poster sessions was encouraged, including a typically one hour long general discussion driven by a facilitator and followed by round table and workshop sessions.

Dr Cvetan Sinadinovski presented the recent AGSO work in Seismology through two papers "Re-assessment of the seismic hazard of Australia (Part II)" and "Strong ground motion simulation of Australian intra-plate earthquakes" in the Engineering Seismology session. It gave rise to substantial interest within the scientific community and many useful comments and new approaches were collected in that area. The next step is to compare the seismic response from our synthetic records with the response spectra recommended for Australia.

There was a special session dedicated to several themes related to the evolution and the application of the earthquake code - Eurocode8. Numerous case studies and research in code development were presented for different countries. It is expected that these Eurocodes will become defacto generic International Standards and as such will be the reference for other codes including the new joint

Australian/New Zealand Earthquake Loading Code. In that context, Australia should co-operate more closely with the non-CEN (European Committee for Standardisation) countries in order to develop the most representative code.

In the exhibition hall some 30 stands were open for the major European and international associations, scientific and technical publishers and industries to display their business, instrumentation and equipment.

Report by Dr Mike Griffith

The 11th European Conference on Earthquake Engineering was held in Paris at CNIT, Paris la Defense from September 6 through 11, 1998. Approximately 760 delegates representing 54 countries (including 3 from Australia) were in attendance. The 620 papers presented at the conference were presented in 8 parallel sessions in the 10 themes outlined above.

There were also four Keynote addresses given during the conference. These were all extremely well delivered overview papers by world experts in their respective fields. The presenters and their paper titles were:

Keynote Addresses:

Prof. G.M. Calvi Performance-Based Approaches for Seismic Assessment of Existing Structures

Prof. J. Mazars French Advanced Research on Structural Walls An Overview on Recent Seismic Programs

Prof. M.J.N. Priestley Displacement-Based Approaches to Rational Limit States Design of New Structures

Prof. A. Pecker Capacity Design Principles for Shallow Foundations in Seismic Areas

From the number of papers that focussed on seismic resistant design with special regard to deformations it is clear that there is a rapidly growing trend towards the adoption of deformation-based design procedures. Discussion seems centred around whether deformation based design procedures should be disguised to look like the current force-based design methods or whether they should be explicit in their focus on deformations rather than forces.

Aspects of capacity design and performance-based design also featured prominently among the many presentations. Of special interest to Australia was the attention given to the status of research in support of the introduction of Eurocode 8. The implications of formal adoption of EC8 by many of the member nations whose seismicity is low-to-moderate (similar to Australia) were widely discussed and debated. Among the key issues were the questions related to the impact of the new seismic design rules on the design of masonry buildings. Unreinforced masonry is a particular form of construction that is widely used in Europe (as it is in Australia). Much analytical and experimental effort is necessary (and is underway) in Europe in order to improve knowledge of how URM behaves under seismic actions.

The proceedings have been published by A.A. Balkema Publishers, Rotterdam (email: [HYPERLINK mail to: balkema@balkema.nl](mailto:balkema@balkema.nl)) on CD ROM. Those interested should contact the publishers or the Conference Secretariat at the address below.

Conference Secretariat, 11th ECEE
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ELSA, Ispra Italy by Dr Mike Griffith

The European Laboratory for Structural Assessment (ELSA) is part of the European Commission's Joint Research Centre (JRC) facility in Ispra, Italy. It features the largest reaction wall/strong floor system in Europe and with its dimensions and load capacity represents a unique tool for large scale testing of structures. The ELSA facility actually houses a 21m long by 16m tall reaction wall which serves a 21m x 25m area of strong floor on one side and a 13m x 25m area of strong floor on the opposite side. There are anchors spaced at 1m in the strong floors and reaction wall. Its respective bending moment and base shear strengths of 200 MNm and 20 MN govern the Reaction Wall load capacity.

To obtain the maximum benefit from the facility, it is being used within the framework of an integrated Community-wide research programme making full use of existing expertise and facilities within the Member States. To this end an Association of Structural Mechanics Laboratories, involving more than 30 members, has been set up to jointly develop detailed research programmes. Collaborative networks emanating from the Association are receiving support from the European Commission's programmes on Training and Mobility of Researchers (HRM, TMR).

The aims of the JRC programme are to:

- improve construction quality and reliability through: harmonisation of design codes and construction rules (EUROCODES) in a single European market; and mitigation of effects of natural disasters.
- increase world-wide competitiveness of European construction industry;
- promote European and international co-operation in research and technology.

The third aim is one that Australian earthquake engineers (practitioners and researchers) might collectively wish to note and address.

The ELSA reaction wall facility is currently being used for prenormative research in support of EC8, the provisional European standard for the design of civil engineering structures in seismic areas. In this context, large-scale confirmatory tests on various types of structures have been, or are being, performed using mainly the pseudo-dynamic test method at ELSA. For those unfamiliar with the pseudo-dynamic test method, it is a test that, although carried out quasi-statically, uses on-line computer calculation and control together with experimental measurement to provide a realistic simulation of dynamic response. The equations of motion for a discrete parameter model of the test structure are solved on-line using a step-by-step numerical integration method. Inertial and viscous damping forces are modelled analytically, while non-linear structural restoring force characteristics are measured experimentally, automatically accounting for hysteretic damping. Some of the major tests conducted to date have been:

- a three-storey steel frame designed according to Eurocodes 3 and 8, with and without seismic isolation devices;
- a four-storey reinforced concrete frame designed according to Eurocodes 2 and 8, with and without masonry infills; and
- an irregular long-span motorway bridge using substructuring concepts to model the deck numerically while the piers were tested pseudo-dynamically.

Special attention is also being devoted to seismic rehabilitation and the preservation of historical buildings and monuments in close collaboration with the national and regional authorities in charge of the cultural heritage of Europe. To that end, a full-scale 2-D slice from a stone building of historical significance in Portugal has been built and pseudo-dynamically tested at the ELSA facility. The test specimen is now being repaired and strengthened using the same technique which was used to repair the Newcastle cathedral building after the 1989 Newcastle earthquake. Tests of the seismically retrofitted

structure will begin shortly. Work is also well underway to test a full-scale replica of a 4-storey lightly reinforced concrete frame with brick infill building in Lisbon, Portugal. This building was constructed over 40 years ago using design details that are no longer used (e.g. 90° bends in ligatures) and the aim of the project is to first evaluate the seismic capacity of the existing building and then to test the efficiency of various seismic retrofit techniques. The results of this work should have wide relevance as there are many such buildings still in service that: (1) were not designed for seismic load; and (2) do not comply with present day design guidelines for gravity load effects.

SPECIAL OFFER ON CONFERENCE PROCEEDINGS

Complete the form below and send to Barbara Butler: fax: 03 9348 1524

Please send me the following publications at the special price listed, plus postage.

- Proceedings of the 1992, 1993 and 1994 Conferences - \$20.00 / pack of three
- Proceedings of the 1995 Pacific Conference on Earthquake Engineering, 3 Volumes - \$90.00 per set
- Adelaide Conference 1996 - \$12 +p&p
- Brisbane Conference 1997 - \$30 +p&p

Invoice and publications to be sent to:

Name

Address

.....

CityState.....

Postcode

Forthcoming Conferences

(Flyers for some conferences are available from Ed)

- **1999, 15-17 February Hobart Tasmania**
The 8th Australia New Zealand Conference on Geomechanics. Conference manager email: travel@southcom.com.au
<http://www.ieaust.org.au/conference.htm>
- **1999, 4-9 July Sydney NSW.**
XIX Pacific Science Congress, University of New South Wales. e-mail reply@icmsaust.com.au
- **1999 IUGG (Birmingham, England)**

Call for abstracts

We would like to bring to your attention the IUGG symposium outlined below. The symposium is jointly sponsored by IASPEI and IAG. We would encourage anyone interested in this area of research to talk about their work at the symposium. The deadline for submission of abstracts is 15 January 1999. Further information about IUGG 1999 can be found on the World Wide Web at <http://www.bham.ac.uk/IUGG99/>

Convenors: Barry Parsons, Department of Earth Sciences, University of Oxford, Parks Road, Oxford OX1 3PR, UK

Fax: 44-1865-272072, Phone: 44-1865-272017

Email: Barry.Parsons@earth.ox.ac.uk

Robert Reilinger, Department of Earth, Atmospheric, and Planetary Sciences, Massachusetts

Institute of Technology, Cambridge, MA 02139 USA

Fax: 1-617-253-6385, Phone: 1-617-253-7860

Email: reilinge@erl.mit.edu

• **1999 TSUNAMI SYMPOSIUM**

May 25-27, 1999, Honolulu, Hawaii USA

Sponsored by The Tsunami Society

SYMPOSIUM SPECIAL TOPICS:

MEGA-TSUNAMIS FROM ASTEROIDS AND SLIDES

• Eltanin Asteroid Impact Tsunami

• 1958 Lituya Bay Tsunami

• Asteroid Tsunami Project

NEW TSUNAMI WARNING CENTER CAPABILITIES

• Pacific Tsunami Warning Center

• Alaskan Tsunami Warning Center

• Japan Tsunami Warning Center

REPORTS OF RECENT TSUNAMI DISASTERS

• 1998 New Guinea Tsunami

• 1996 Sulawesi Island Tsunami

• 1995 Antofagasta, Chile Tsunami

• 1994 Skagway Landslide Tsunami

TSUNAMI CIVIL DEFENSE PROJECTS

• Hawaii Civil Defense Local Tsunami Problem

• National Tsunami Hazard Mitigation Program

• Caribbean Tsunami Program

FULL NAVIER-STOKES TSUNAMI MODELING

• 1994 Skagway Tsunami

• 1969 Gorringe Bank Tsunami

• Asteroid Tsunamis

Papers are invited on any other tsunami related topic. Proceedings will be published in special issues of "Science of Tsunami Hazards". The meeting will be held at the University of Hawaii East-West Conference Center. Inexpensive rooms will be available near the East-West Center. The registration fee will be \$150 U.S. for Tsunami Society members, \$300 for others.

To receive the second announcement:

Send your name, address and the title of your presentation to Dr. Charles Mader, Tsunami Symposium Program Chairman, 1049 Kamehame Drive, Honolulu, HI 96825-2860 USA

• **1999 SDEE'99, 9-12 August 1999 Bergen Norway**

9th International Conference on Soil Dynamics and Earthquake Engineering

The Ninth International Conference on Soil Dynamics and Earthquake Engineering (SDEE '99) is hosted by the University of Bergen in collaboration with the Norwegian Association for Earthquake Engineering. It represents the continuation in a series of successful conferences starting with the first one in Southampton, U.K., in 1982 and continuing with the latest one in Istanbul, Turkey in 1997. These series of conferences aim to contribute to the international understanding of the problems and progress in Soil Dynamics and Earthquake Engineering and, as such, complements the objective and the role of the International Journal that bears the same name.

The technical programme will include oral sessions and poster sessions. The official language for the Conference will be English. The scientific sessions will be organised under the following topics:

1. Seismicity, Ground Motion and Site Effects

2. Seismic Hazard and Risk Assessment

3. Geotechnical Engineering (foundations, liquefaction, slope stability, constitutive models)

4. Laboratory and Field Tests of Soils and Foundations

5. Analysis of Soil-Structure Systems
6. Seismic Codes and Standards
7. Special Structures and Systems (bridges, dams, underground structures)
8. Soil Dynamics and Earthquake Engineering Related to Off-shore Installations.
9. Extended Structures and Systems (lifelines, urban systems)
10. Experiences Derived from Recent Earthquakes

Authors wishing to present papers at the Conference are requested to submit abstracts to the Secretary, SDEE '99, Local Organising Committee. Abstracts of one page stating the purpose, methodology, results and the conclusions should be forwarded to the LOC latest on January 31, 1999. The name, title organisation, postal and e-mail addresses and the telephone and fax numbers should be provided on the abstract page. The results of the review will be communicated to the authors by March 31, 1999. Authors of selected papers will be invited to publish their full papers in the Proceedings Volume and the Special Issue of the International Journal 'Soil Dynamics and Earthquake Engineering '.

Information regarding registration, accommodation and abstract submission can be obtained from the SDEE'99 Home Page at: <http://www.ifjf.uib.no/seismo/sdee99.html>

Sponsors and Technical Exhibits Exhibition facilities will be available for those firms and organisations wishing to display products, services, hardware, software and literature. Contact SDEE '99 LOC for more information and sponsorship, or to be included in the mailing list.

- **2000, 30 Jan - 4 Feb, Auckland New Zealand. 12th WCEE/PCEE.**

NEW (&OLD) BOOKS / REPORTS

The Meckering and Calingiri earthquakes October 1968 and March 1970

Geological Survey of WA Bulletin 126

The Cadoux earthquake 2 June 1979

Geological Survey of WA Report No 11

Price \$31 and \$12 respectively. Postage \$10

GSWA Cnr Adelaide Tce and Plain St Perth, 6000 Phone (08) 9222 3333

Australian Seismological Report - 1995

AGSO Sales Centre ph: 06 249 9519, fax: 06 249 9982

Acceptable Risks for Major Infrastructure

Eds P Heinrichs and R Fell, Balkema 1995. Proceedings of the Seminar on Acceptable Risks for Extreme Events in the Planning and Design of Major Infrastructure. Sydney NSW Australia, 26 - 27 April 1994.

Report on the January 17, 1995 Great Hyogo-Ken Nambu (Kobe) Earthquake.

Lam Pham & M Griffith. CSIRO DBCE 95/175(M).

Isoseismal Atlas of Australian Earthquakes - Part 3 AGSO Record 1995/44, \$50 + pp

AGSO Sales Centre phone: 06 249 9519, fax: 06 249 9982

Fundamentals of Earthquake Prediction by Cinna Lomnitz:

John Wiley & Sons.

The Geology of Earthquakes by R.S. Yeats, K.E. Sieh, and C.R. Allen:

Oxford University Press, 576 p., price \$65.00.

Paleoseismology, edited by James P. McCalpin.

Academic Press, 576 p., price \$89.95.

Earthquakes and Geological Discovery by Bruce Bolt.

W H Freeman and Co., 1993.

Risks and Realities

Centre for Advanced Engineering University of Canterbury, Christchurch New Zealand.

This book mainly presents the results of an investigation into the vulnerability of lifelines serving metropolitan Christchurch.

WCEE 2000

AUCKLAND NEW ZEALAND

Please Note: The New Zealand National Society for Earthquake Engineering will host the next World Conference on Earthquake Engineering in Auckland

30 January - 4 February 2000.

Letter to Editor

GURIA CONSULTING
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Dear Editor

It was good seeing all the familiar faces at the recent gathering of the AEES in Perth. I was hoping that you would have room in the next publication of our Newsletter for the following comments pertaining to two papers presented at the seminar:-

1) Perth Earthquake Risk - Has it been Over-Rated? by George Walker

This was a very enjoyable and entertaining, if not controversial paper. One of the major points George made in support of his hypothesis was the recurrence interval of Meckering-sized earthquakes in the zone nearest Perth. It is interesting to note that the GML (1987) estimate for this interval was about 450

± 100 years, compared with his estimate of (from memory) about 400-500 years. The one adopted for the GMLR (1990) paper was the lower end of the above range.

His inference that current attenuation relations overestimate intensities expected in Perth during a Meckering event is misleading, in that using our 1987 and 1990 WA attenuation, an intensity below MMVI is obtained, whereas we all know that intensities felt in the city were at least MMVI. In hindsight, the late Ian Everingham, who compiled the intensity map for the Meckering Earthquake, agreed with me that some of the damage and effects in Perth could have been interpreted as MMVI-VII, and possibly higher.

2) Earthquake Risk in Cairns - A Pilot Study by Trevor Jones and others

My response to the question put to me by the Chair (Kevin McCue) after Trevor's presentation, regarding amplification observed in our Perth Microzonation Study (GK&T, 1995), may need further clarification. I realised afterwards, that Kevin may have meant peak ground velocity (PGV) amplification instead of spectral ratios, which I assumed at that time.

During two recorded Cadoux earthquakes (ML4.5 and ML3.3), the PGV amplification between the sedimentary sites in the city and the reference rock site at Mundaring, was between 7 and 10.

In this paper we outline how an attenuation function was devised by comparing spectral ratios from these earthquake recordings with those from simultaneous microtremor recordings at the same sites. This function was then used to modify spectral ratios from microtremor recordings at over 100 basin sites.

Spectral ratios thus derived for the basin/bedrock sites, varied between about 2 to 10 for ground periods of 0.2-5s. The locations of the highest spectral ratios corresponded well with the regions of greatest intensity during the Meckering Earthquake of 1968. Typically, these sites had an intensity of about one higher than the mean, which empirically usually corresponds to an increase in PGV and PGA by a factor of two.

This appears to be at odds with the above PGV amplification data of 7-10. The explanation to this apparent contradiction is twofold - firstly the factor of 2 is introduced as an increment above average sites, as explained in the previous paragraph, and of course the factor of 7-10 was between basin and hard-rock sites, which is expected to be considerably greater. Secondly, the PGA (and PGV) in GK&T (1995) are meant to be more like the Acceleration Coefficient in the AS1170.4 (1993), rather than a PGA operating for one cycle over a very short duration.

The advantage of the technique we developed for Perth over the Nakamura Method, is that there was a strong correlation between the various spectral ratio contours with gravity and geological contours (down to 800 m).

Hopefully this clears up any ambiguity. For those who have not been able to acquire a copy of the 1995 paper, or wish to continue the discussion, please contact me at the above address. Or, better still if you are passing through the Margaret River area, give me a call on (08) 9757 7553 and arrange a visit.

Many thanks & Cheers

Brian Gaull

References:

GML (1987) = Gaull B.A., Michael-Leiba M.O.(1987) - Probabilistic earthquake risk maps of southwest Western Australia. BMR Journal of Australian Geology & Geophysics, 10, 145-151.

GML&R (1990) = Gaull B.A., Michael-Leiba M.O. & Rynn J.M.W.(1990) - Probabilistic earthquake

risk maps of Australia. Australian Journal of Earth Sciences, 37, 169-187.

GK&T (1995) = Gaull B.A., Kagami H. and Taniguchi H.(1995) - The microzonation of Perth, Western Australia, using microtremor spectral ratios. Earthquake Spectra, 11, 2, 173-191.

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