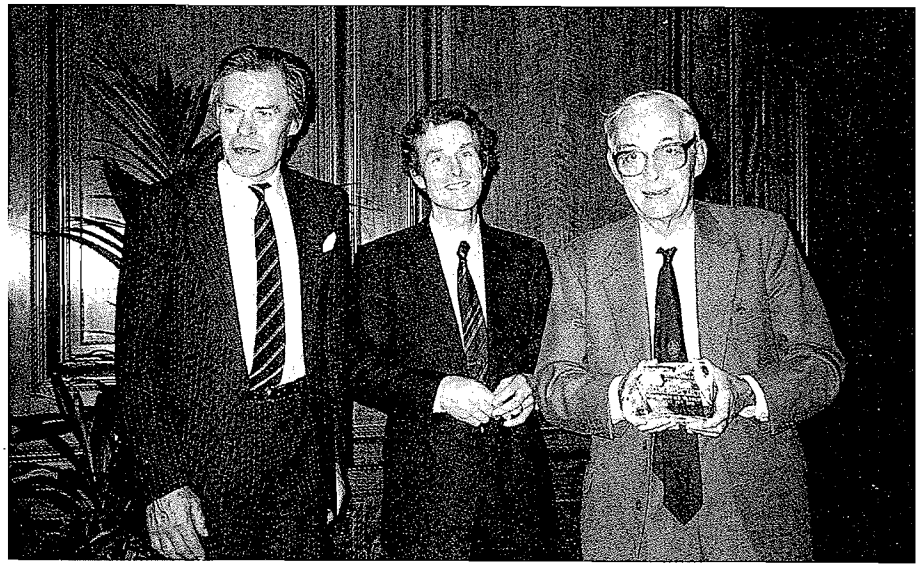
THE SOCIETY FOR EARTHQUAKE AND CIVIL ENGINEERING DYNAMICS

SECED NEWSLETTER

July 1991, Vol. 5, No.3

THE REDUCTION OF VIBRATIONS

The third Mallet-Milne lecture attracted a record audience to hear Professor Geoffry Warburton's lecture on the timely topic, The Reduction of Vibrations. Vibration reduction has special significance in many areas of engineering particularly in the field of earthquake engineering. Vibration isolation and suppression techniques provide earthquake engineers with a valuable method of achieving a high degree of protection to structures exposed to very severe levels of earthquake ground shaking. Design methods are becoming well established and the technique is gaining widespread acceptance in the most seismically active regions of the world.



Professor Grootenhuis, Edmund Booth and Professor Warburton after presentation of a momento to commemerate the sucess of the third Mallet-Milne lecture.

The Mallet-Milne lecture is intended to be something really special, a biennial event which, by its excellence and entertainment value, one makes a great effort not to miss. Professor Geoffrey Warburton's lecture on May 29th turned out to be no disappointment; it was a masterly exposition, based on the work and experience gained during a highly distinguished career, of four generic methods of reducing earthquake vibrations, namely added damping, base isolation, tuned mass dampers and active control. In the best tradition of scholarship, the methods were reduced to their essence so that engineering comparisons and inferences could be drawn, by means of simple yet effective examples. It was no less than would be expected from someone, who as we were reminded by Professor Grootenhuis in his introduction and Professor Severn in his vote of thanks, has dedicated his professional life to getting to the heart of complex engineering problems.

The published lecture will be available by the early autumn from John Wiley at a cost of £17.50; send cheques for £9.00 payable to Institution of Civil Engineers to James Dawson at the ICE headquarters to secure one of the limited number of prepublication copies.

And the entertainment side? A colourful exhibition by Arup Acoustics, British Geological Survey, Imperial College, Rubber Consultants, John Wiley and SECED was mounted in the foyer outside the ICE Buttery. The BNFL/ Bristol University display, which was more of a structure in its own right erected in the Brunel Room, attracted a great deal of interest from the 150 people at the lecture.

The reception afterwards was even more pure entertainment value; its success was enhanced by the really excellent spread provided by the Institution, and can be further judged from the fact that more drink had to be ordered half way through the proceedings.

SECED is very grateful to the generous sponsorship of Arup Acoustics, BEQE, Kajima and John Wiley which made the lecture possible. A formal review of the lecture publication by Ray Clough will be included in a future edition of the Newsletter.

To reserve a copy of the Third Mallet-Milne lecture publication contact James Dawson at,

The Institution of Civil Engineers
Great George Street
London SW1P 3AA
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Fax 071-222-7500

NCEER VISIT

June 1991

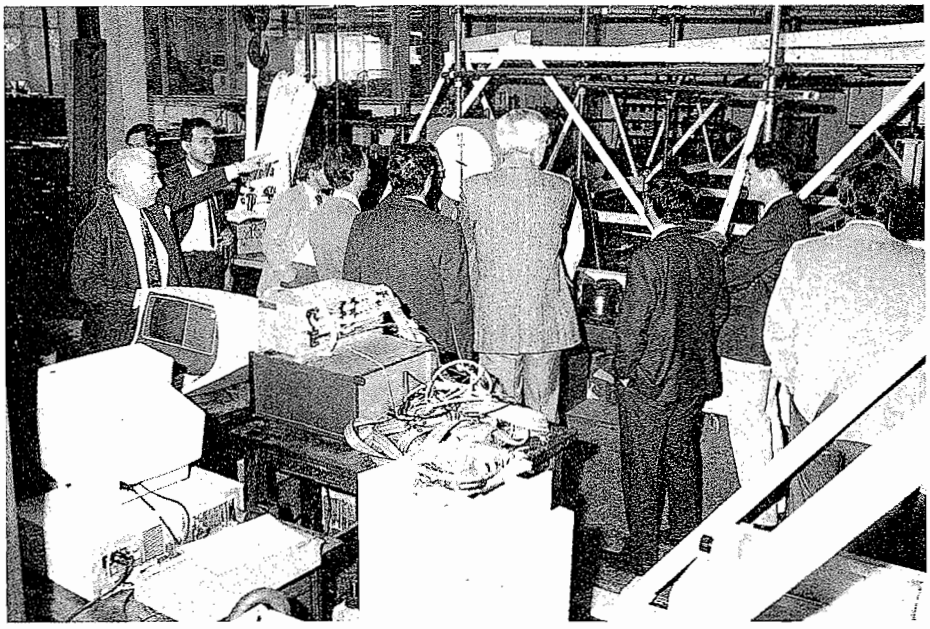
A party of UK earthquake engineers visited the US National Centre for Earthquake Engineering (NCEER) in April/May 1989, under the auspices of the UK Science and Engineering Research Council's n&n programme. The party comprised Professor S. Brown *(soil mechanics, Nottingham University),* Professor D. Muir-Wood *(soil mechanics, Glasgow University),* Dr. R.S. Steedman *(soil mechanics, University of Cambridge)*, Dr. A.S. Elnashai *(structures, Imperial College),* Dr. A. Chandler *(structures, University College)*, Mr. E. Booth *(structures, Ove Arup and Partners)* and Drs. A. Blackborough and C. Taylor *(University of Bristol).*

Professor Chandler, Co-ordinator of the SERC Geotechnics Programme, addressing the guests at Imperial College.

The UK group visited Rensselaer Polytechnic Institute, Cornell University, State University of New York at Buffalo and the University of Princeton. During these visits, work undertaken by research groups from both sides was discussed and preliminary thoughts on possible co-operation were exchanged.

The return visit by US researchers was slightly delayed since NCEER was going through a reporting period and renewal of the Centre's grant from NSF was under discussion. The visit finally took place during the period 17 to 19th June 1991. The delegation comprised the following:

Professor R. Dobry
(soil mechanics, RPI)
Professor P. Gergely
(structures, Cornell)
Professor T. O'Rourke
(soils/lifelines, Cornell)
Professor A. Papageorgiou
(seismology/soils, RPI)
Professor A. Reinhorn
(structures, SUNY/Buffalo)
Professor R. Richards
(soils, SUNY/Buffalo)
Professor H. Steward
(soils, Cornell)



Professor Dowling, Head of Department, explaining the purpose of a series of tests to the NCEER delegation in the structures laboratory

The first day was spent at Bristol, where Professor Roy Severn, President of ICE welcomed the NCEER group and a visit to the shaketable facility was organised. Other research projects underway at Bristol were discussed and common areas of interest were identified.

The second day, 18th June, was spent at Cambridge, where Professor Schofield introduced visitors to the centrifuge facility and the soil dynamics research activities. Dr. Spence and Dr. Zang outlined the current research interests in earthquake vulnerability studies and centrifuge testing, respectively. Also, Dr. Chan (Glasgow) gave a presentation on his work on dynamic analysis of soils. In the evening the NCEER delegation attended the British Geotechnical Society's SecondGeotechnique Lecture given by Dr. M. Bolton and Dr. R.S. Steedman.

The final day of the visit was spent at Imperial College. Professor Dowling gave an opening address which was followed by short presentations from Professor Ambraseys and Dr. Elnashai on engineering seismology and earthquake engineering research at IC. This was followed by a visit to the Structures and the Concrete laboratories as well as the IC shaking table facility. At a later stage, Professor Chandler, who was attending as SERC

Sub-discipline	Subject	Collaborators
Structural	Analysis and design of steel frames with semi-rigid connections	SUNY/Buffalo, Cornell, Imperial College
	Comparison of results of non-linear dynamic analysis of RC multi-storey frames	SUNY/Buffalo, Cornell, Imperial College
	Pseudo-dynamic testing compared to cyclic testing of sub-assembledges	SUNY/Buffalo, Cornell, Imperial College
	Retrofitting of RC structures from/by local/ global intervention	SUNY/Buffalo, Cornell, Imperial College
	Development of shaking table shear stacks/boxes	SUNY/Buffalo, Bristol
	Performance and design of secondary systems and isolation techniques	SUNY/Buffalo, Bristol
Seismological	Micro-earthquake monitoring for major fault resolution with a view to fault modelling	RPI, University of East Anglia
Geotechnical	Centrifuge modelling of bridge foundations	RPI, Cambridge
	Post-earthquake settlement in liquefaction-susceptible soils	Cornell, Glasgow, Nottingham
	Numerical modelling of centrifuge experiments	RPI, Glasgow
	Cyclic behaviour of silt contaminated with clay or sand	Cornell, Nottingham
	Comparison of numerical computer codes for soil dynamics	Princeton, Glasgow

Areas of agreement for collaboration between UK and NCEER researchers

Co-ordinator as well as a Professor at IC, escorted the NCEER group on a visit to the Soil Mechanics Laboratory.

Time was allowed in the time-table of the IC visit for discussion on future collaboration and development of joint research programmes. The NCEER and UK researchers broke into small working groups and brief outline proposals were drafted. The main areas of co-operation and the institutions involved are as shown in the table above.

The final activity was a presentation, advertised as a SECED informal meeting, given by Professors Gergely and O'Rourke on the overall NCEER strategy and policy for the next five years, highlighting priority areas. The discussion that followed emphasised the fact that there is considerable common interest between UK and NCEER workers in the field. The meeting was concluded by Professor Muir-Wood, who is the overall organiser of the NCEER visit. In the evening, the guests attended the ICE Conversazione and departed to various destinations on 20th June 1991.

It is hoped that this visit will consolidate existing links, such as the Memorandum of Co-operation in Research and Education signed between Cornell and Imperial College last March, and the ongoing co-operation between Cambridge and RPI in centrifuge testing. It is also envisaged that new items of co-operation will be developed, such as those identified in the table of collaboration.

THE DYNAMIC TESTING AGENCY (DTA)

A report from the National Engineering Laboratory

An Agency concerned with the quality assurance of dynamic testing has recently been established. The DTA is an industrial club which has been set up to develop and establish independent, uniform quality assurance standards in the field of engineering testing, measurement and data analysis in structural and machine dynamics. Membership is highly advantageous to all organisations with interests in these areas.

Main Objective of the Agency

The fundamental aim of the DTA is to help companies involved in structural dynamics testing to improve performance and efficiency through the preparation and distribution to members of authoritative documents on best practice and practical quality assurance guidance.

The Advantages of Joining the Agency

* Acquisition of expert knowled via collaboration or participation in club activities.
* Time saved in trying to find solutions to problems that have already been solved elsewhere.
* Information on the latest developments in equipment, software and research, and on market and standards initiatives which may affect the competitive environment.
* Demonstration to customers of a company's intention to employ best practice and ensure the quality of its testing and data analysis activities.
* Cost sharing for the development of best-practice documentation.
* Exclusive access to key products such as handbook documentation and benchmark services, and a reduced price for open publications.
* Reduced rates at selected workshops, seminars,conferences and training courses.
* Influence on the formulation of standards and the way that the Agency evolves.
* Facilitation of contacts, sharing of experiences, discussion of problems, access to expertise and consultancy.
* Accreditation of technical staff, provide confirmation of their competence to customers.

The Need for a Quality Assurance Agency in Dynamic Testing

Dynamic testing and associated measurement and analysis is increasingly an indispensable tool in the design and development of cost competitive, safe and reliable engineering structures and components. Dynamic testing is wide ranging, complex, and often the methods used and the results obtained are dependent on the experience and judgement of the tester. The lack of specific quality assurance standards for the analysis and measurement of dynamic data is a cause for concern, particularly when increasingly the development of sophisticated and robust computer-aided methods enable relatively inexperienced engineers to carry out testing previously recognised as requiring experienced personnel.

The Role of the Agency

The Dynamic Testing Agency addresses the need for the quality assurance standards in the analysis and measurement of dynamic data and provides practical and authoritative guidance on best practice. Reference to such accepted standards improves experimental and analytical practice in dynamic testing and provides protection against possible accusations of poor practice.

The Nature of the Agency

The Agency is demand led by industry and is non-bureaucratic. It is non-profit making and is controlled by and acts on behalf of its members. The Agency takes the form of a club, of mutual benefit to all who participate, and which will evolve as required by its members. Direction of the Agency is undertaken by a steering committee made up of representatives from major companies and leading universities.

Technical Scope

The Agency is concerned with testing procedures, instrumentation, measurement, and experimental data and analysis techniques in the area of structural dynamics testing, plant reliability and maintenance planning. The technical subject areas include:.

* Instrumentation
* Data acquisition and signal processing
* Structural integrity assessment
* Shock and vibration testing
* Modal testing and analysis
* Validation of theoretical models using experimental data
* Condition monitoring of vibrating or rotating plant.
* Laboratory simulation of dynamic service loading
* Testing of non-linear structures
* Dynamic testing of materials
* Acoustic excitation
* Flow induced vibration

An important activity of the Agency is to review specification standards relating to structural and machine dynamics. An authoritative body is needed to represent the views of users to standards organisations, to reconcile differences and to draw together diverse specifications.

Existing Standards

Present ISO and BSI standards are of limited usefulness, since they are restricted to the mechanics of test measurement. Key matters of interpretation, analysis, and applications of the data in conjunction with particular test structures are not being addressed by current standards. Although a number of learned societies and informal technical groups are providing valuable contributions, no authoritative documentation is being produced for dissemination and no organisation is taking a strategic initiative in relation to quality assurance in dynamic testing.

Co-ordination of the Technology

The Agency sponsors and co-ordinates evaluations and studies in key areas. Working groups are established to advise and set standards for particular specialist sectors. A register of systems, users, key documentation, and research publications is being maintained by a secretariat who collate information and provide the interface for contacts between members.

Promotion of, and Support for, the Technology

Activities to enhance the status and the perceived value of the technology are being undertaken. The Agency represents the views of the specialist community and provides leadership. Independent advice is available from the Agency to enable potential customers for equipment and services to make better informed decisions and to have more collective influence. A formalised system for quality assurance in experimental techniques encourages theoreticians to have more confidence in the use of experimental data for model validation and refinement.

Technology Transfer

The Agency promotes standardisation and the expanded use of the technology through improved acceptance of the accuracy and reliability of the techniques. Workshops and seminars are organised to promote best practice and familiarise users with new developments. Key areas of research are identified and publicised. The practical exploitation of university research is encouraged. Expert knowledge is made available, codified and disseminated to a wider community.

Training and Accreditation

The Agency encourages practitioners of dynamic testing and condition monitoring to develop greater expertise and familiarity with current specialist hardware and software, to exploit the full potential of current techniques, and to extract the maximum benefit from their efforts. The Agency also aims to provide a means of personal accreditation of user competence through the development of accreditation benchmarks, recognition of relevant experience and linking to approved training courses.

Management and Secretariat

Although policy matters are decided by the steering committee which provides the leadership, guidance and executive control of the Agency, general management and secretariat functions are undertaken by NEL. Information to subscribers is provided by a regular bulletin, and a user and specialist register are being compiled, together with a register of important documentation and a bibliography of key scientific papers. The office forms the hub of a communications network which is useful, for example, in making contacts and in assisting engineers to locate information or particular experts for problem solving in specialist areas.

Funding

The Agency is funded jointly by industry and the DTI. The industrial funding is provided by subscriptions from members. The standard annual subscription is £900 per company, limited to a single site*. The annual subscription is reduced to £500 for SMEs** and Universities. Associate and individual memberships are also available at annual subscription rates of £100 and £30 respectively.

* *Multi-site discounts are available.*

** *Small or Medium sized Enterprise (i.e. a company with fewer than 400 employees).*

Concluding Remarks

This article has presented the need for an Agency to encourage industrial collaboration in the establishment of standardised quality assurance procedures in structural dynamics and to represent the interests of practising industrial engineers who have concerns in this area. The Agency has now been founded and well known companies such as British Aerospace, Rolls Royce, GKN, Nuclear Electric, GEC Alsthom, Siemens-Plessey, Schlumberger, SDRC, and the Rover Group are already participating, in addition to Universities such as Manchester, Southampton and Imperial College.

The Dynamic Testing Agency seeks to form co-operative relations with learned societies such as SECED which represent related sectorial interests. Such connections between professional and standards bodies are of mutual benefit, particularly as the single European market approaches. Attempts will be made to take initiatives on behalf of the experimental community and to close the gap between the theoretical and experimental approaches to dynamic structural analysis.

It is of major importance to all sectors of industry that manufactured products are fit for purpose. Products must have sufficient strength and integrity to provide an adequate and predictable life in service. The Agency's activities to promote best practice in dynamic testing and analysis should form a focus for improvements in the safety and reliability of many industrial products.

Acknowledgements
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NOTABLE EARTHQUAKES APRIL - JUNE 1991

Reported by British Geological Survey

YEAR	DAY	MON	LAT	LON	DEP KM	MAGNITUDE ML	MB	MS	LOCALITY
1991	05	APR	5.951S	77.087W	33		6.5	6.7	NORTHERN PERU
		Over 100 people killed, 600 injured and extensive damage (VII MM) in the Moyobamba and Tarapoto area of northern Peru. Felt throughout northern Peru and much of Ecuador							
1991	05	APR	58.344N	0.999E	10	3.1			CENTRAL NORTH SEA
		This location is near to the Sleipner oil and gas field in the Norwegian sector. No felt reports have been received.							
1991	22	APR	9.676N	83.082W	10		6.6	7.5	COSTA RICA
		47 people were killed in the Limon area of Costa Rica and 28 died in western Panama. Over 500 were injured and 10,000 left homeless. Damage up to intensity X MM occurred in the Limon area and many roads were blocked by landslides. The earthquake was felt throughout Central America from Honduras to eastern Panama and a 2 metre Tsunami was generated on the Costa Rican coast.							
1991	25	APR	60.340N	1.625E	11	4.2			NORTHERN NORTH SEA
		This location is about 50 km north-west of the Bressay oil feild, in the UK sector, east of Shetland. No felt reports have been received.							
1991	29	APR	42.489N	43.647E	10		6.2	7.0	WESTERN CAUCASUS
		At least 114 people killed, 1000 injured and 67,000 homeless. Severe damage (VIII MM) and landslides in the Chiatura area of Georgia, USSR. Felt throughout the western Caucasus, Georgia, northern Armenia and in Eastern Turkey.							
1991	08	JUN	8.858N	127.291E	33		6.7		PHILIPPINE ISLANDS
1991	16	JUN	52.433N	3.412W	13	3.1			NEWTON, POWYS
		Felt in the Newtown area of Powys, Wales							
1991	20	JUN	1.121N	122.828E	33		6.2	7.1	MINAHASSA PENINSULA, INDONESIA
		Slight damage in the Gorontalo area. Felt strongly in Manado							
1991	20	JUN	53.145N	1.374W	1	0.7			CLAY CROSS, DERBYSHIRE
		Felt at Clay Cross. Believed to be coal mining induced. A number of other coalfield areas throughout the UK continue to be affected by tremors believed to be mining induced. These include the coalfields of Nottinghamshire, Staffordshire, County Durham, South Wales and Central Scotland							

Volcanic Eruptions

Two Pacific margin volcanoes erupted violently during June 1991.

Mount Unzen in Japan erupted on 3rd June after 199 years quiescence, killing 37 people, including three volcanologists monitoring the volcano. Continuing activity in the form of ash falls and mudflows has made over 10,000 people homeless.

Mount Pinatubo on Luzon Island in the Philippines erupted on 9th June in one of the largest volcanic eruptions this century after being dormant for over 600 years. At least 60 people died and many thousands were left homeless following widespread ashfalls. A number of moderate earthquakes were associated with the continuing eruption, particularly on 15th and 16th June.

IDNDR Announce Three Spearhead Projects

The International Council of Scientific Unions has recommended to the United Nations three Spearhead Projects for collaborative support by national governments and UN agencies. These Three Spearhead Projects are in the areas of Volcanoes, Earthquakes and Tropical Cyclones, and are intended to bring large scale relief to counties in seismically active areas and to countries plagued with tropical cyclones.

IDNDR 1990-2000

For further information contact the IDNDR Secretariat in Geneva or New York

CONFERENCE NEWS

3rd SECED Conference
Earthquake, Blast and Impact (Measurement and Effects of Vibration)
UMIST, Manchester
18-20 September 1991

Don't forget - registration before the 1st July leads to a discounted registration fee (£320 for delegates, £270 for authors). After that date, and up until the anticipated closing date of 28th August, the full registration fee applies (£352 for delegates, £297 for authors). For further details, please contact Rachel Coninx at,

The Conference Office,
Institution of Civil Engineers,
1-7 Great George Street,
London. SW1P 3AA.
United Kingdom.

Tel: 071 222 7722
Fax: 071 233 1743

Structural Integrity Assessment
A Major Conference
Manchester, UK.
31 March - 2 April 1992

This major conference is being organised by the Dynamic Testing Agency and the Engineering Integrity Society to cover all aspects of the assessment of the integrity of engineering structures and components from conception and design, through operation, to residual life evaluation and life extension.

The conference will provide a forum for the exchange of expertise and knowledge amongst engineers from a wide range of professional backgrounds, disciplines and industries including power generation, aero-space, transport, off-shore, process, construction, and the universities and polytechnics. There will also be an exhibition of structural integrity assessment products and services.

The conference will be held in the Owens Park Conference Centre, the University of Manchester, 3 miles south of the city centre and easily accessible by road, rail or air (via Manchester's International Airport). The scope of the conference is wide-ranging to encompass those disciplines necessary for integrity assessment. Papers are invited on the following topics, but these are not intended to be exclusive.

* structural testing, modelling and simulation;
* material properties in structural design and failure diagnosis;
* structural monitoring;
* residual life evaluation;
* life extension;
* procedures and documentation of structural assessment, reliability and safety;
* failure evaluation; fracture, fatigue, creep, instability etc;
* quality assurance and standards for structural evaluation;
* structural dynamics;
* NDT techniques and applications;
* failure investigations;
* stress analysis and measurement.

Invited keynote speakers will introduce major topics.

The papers presented will be published in a volume of conference proceedings.

For further information contact Joe Fairbairn at NEL.

1992 AICB International Congress in Prague

The 17th International Congress of the AICB (the International Association against Noise) will be held at the Technical University of Prague, Czechoslovakia, from 23-25 June 1992. Entitled "The aims for noise control in the Europe of the future", the congress will be a forum for the exchange of ideas and information on noise control. Main topics of the congress will be: assessing the impact of noise on the environment; industrial and community noise; the economics of noise control; and recommendations for noise reduction. Emphasising the international nature of the congress, simultaneous translation into English, German, French, Czech and Slovak is available.

For further information, please contact the organising secretary:
Czech Technical University, Prague
Faculty of Civil Engineering, Thakurova
7 Ing. Karel Novotny
CS 166 29 PRAGUE
Czechoslovakia

Phone: +42 22 332 4760
Fax: +42 22 311 7008
Telex: 112 006

Tenth World Conference on Earthquake Engineering
19-24 July 1992
Madrid, Spain

For further information contact:

IOWCEE Secretariat
TILESA
Princesa, 81, 2. I
28008 Madrid, Spain

Tel: (34-1) 544 88 54
Fax : (34-1) 544 98 75

WHAT'S ON
July - September 1991

15th-18th July, 1991
Fourth International Conference on Recent Advances in Structural Dynamics
Southampton University

23rd August 1991
ESEE Seminar
State-of-the-Art of Structural Control Research in the USA
S. Masri
2.00 for 2.30 pm, Imperial College, London

18th-20th September 1991
3rd SECED Conference
Earthquake, Blast and Impact (Measurement and Effects of Vibration)
Organising Chairman - Dr. J. Maguire.
UMIST, Manchester.

FORTHCOMING EVENTS

6th-12th October 1991
16th EAEE Regional Seminar
Stara Lesna, Czechoslovakia

29th-31st October 1991
62nd Annual (SAVIAC) Shock and Vibration Symposium
Springfield, Virginia, USA

30th October 1991
SECED Meeting
Measured Effects of Wind Dynamics on Buildings
Institution of Mechanical Engineers

11th-15th November 1991
University of Missouri - Rolla
First International Short Course on Dynamics of Structures and Structure-Foundation Soil Systems
San Francisco, USA.

18th-23rd November 1991
NZ Nat. Soc. Earthq. Eng.
Pacific Conference on Earthquake Engineering
Auckland, New Zealand

4th December 1991
Joint SECED/ICE Hazards Forum Meeting
Earthquakes: Impact on the Community
Half-day Public Meeting
Institution of Civil Engineers.

22nd January 1992
SECED Meeting
UK Work Related to Eurocode 8
Chairman: Dr. B. Skipp
Institution of Civil Engineers

27th January 1992
Joint SECED/British Dam Society
Dams and Seismic Effects
Institution of Civil Engineers

26th February 1992
SECED Meeting
Blast and Impact
T.J. Wilton
University of Nottingham

25th March 1992
Joint SECED/EEFIT/EFTU Meeting
Reports from the Field of Recent Earthquakes
Institution of Civil Engineers
also EEFIT AGM

29th April 1992
SECED Meeting
Report on the Work of Bristol Shake Table and Pseudodynamic Testing at Imperial College
Imperial College, London
also SECED AGM

27th May 1992
SECED Meeting
Validation of Geotechnical Computer Codes by Centrifuge and Shaking Table Tests
Cambridge University

19th-25th July 1992
Tenth World Conference on Earthquake Engineering,
Madrid, Spain.

RECENT PUBLICATIONS

"Directory of Practitioners in Earthquake Engineering and Civil Engineering Dynamics", Issue No. 2, April 1988.

1987 Mallet-Milne Lecture, "Engineering Seismology", by Prof. N.N. Ambraseys, Volume 17 of Earthquake Engineering and Structural Dynamics (Special Issue).

1989 Mallet-Milne Lecture, "Coping with Natural Disasters", by Prof. G.W. Housner.

"Earthquakes and Earthquake Engineering in Britain", 1st SECED Conference, 18-19 April 1985, University of East Anglia.

"Civil Engineering Dynamics", 2nd SECED Conference, 24-25 March 1988, University of Bristol.

"The San Salvador Earthquake of 10th October 1986", A field report by EEFIT, 1987.

"The Chilean Earthquake of 3rd March 1985", A field report by EEFIT, 1988.

"The Mexican Earthquake of 19th September 1985", A field report by EEFIT, 1986.

"Engineering Aspects of the Manjil (Iran) Earthquake of 20 June 1990", A field Report by EEFIT.

"Engineering Aspects of the Newcastle, Australia Earthquake of 28 December 1989". A field Report by EEFIT.

"EEFIT Constitution and Aims and Methods", EEFIT booklet.

"Earthquake Design Practice for Buildings", David Key, 1988.

"Dams and Earthquake", A conference held at the ICE 1st-2nd October 1980.

"Earthquakes", Books, pamphlets and serial publications of interest to earthquake engineers, Thomas Telford Ltd.

The Loma Prieta Earthquake (Santa Cruz, California) of 17th October 1989; Seismological, Geotechnical and Structural Field Observations. A report from Imperial College, London.

For information about the availability and cost of SECED publications contact James Dawson at The Institution of Civil Engineers, Great George Street, Westminster, London SW1P 3AA.

SECED NEWSLETTER

The SECED Newsletter is published four times a year by the SOCIETY FOR EARTHQUAKE AND CIVIL ENGINEERING DYNAMICS. The Newsletter is issued in January, April, July and October and contributors are asked to submit articles as early as possible in the month preceding the date of publication. Manuscripts should be sent typed on one side of the paper only, and a copy on a PC compatible disk would be appreciated. Diagrams should be sharply defined and prepared in a form suitable for direct reproduction. Photographs should be high quality and black and white prints are preferred wherever possible. Diagrams and photographs are only returned to authors upon request. Articles should be sent to Nigel Hinings, Editor, SECED Newsletter, Allott & Lomax, Fairbairn House, Ashton Lane, Sale, Manchester, M33 1WP, United Kingdom. (Tel 061 962 1214; Fax 061 969 5131).

Produced by Allott & Lomax, Manchester