Issue 7 November 2002

newsletter

supported by the DG Research of the European Commission

www.samco.org

contents

published by vce

SAMCO NEWS

Structural Assessment Monitoring and Control Issue 7 November 2002

Preparing for the 1st Call in 6FP

The landscape in research and development in Europe has changed drastically. The new instruments of Integrated Projects and Networks of Excellence are a challenge for the community. The different initiatives, be it the SAMCO workshop, the E-Core meeting or the coordinators meeting in the Environment Program showed that there is plenty of different expectations on how the new instruments should look like.

Compared to other programs SAMCO has the advantage of having started early and being therefore on schedule for the 1st call. In order to really define breakthrough technologies and to bring together all the key players in the field the E-MOI proposal has received so far up to 100 expressions of interest to participate. The further activity plan foresees a 1st arrangement of activities for mid December.

The management is still looking for potential strong partners that are willing to contribute. In case that you are interested please send us an e-mail (samco@vce.at) describing your expertise and idea for participation. Information on the procedure can be found on the SAMCO home page : (www.samco.org/6fp).

The next steps will be:

- Development of the final structure of the proposal
- Contact to potential partners with questions on their company profile and particulars
- Description of activities
- Determination of activity leaders
- Definition of integration activities
- Preparation of a list of national programs, serving the European ERA concept
- Identification of key persons within the initiative
- Draft of a budget

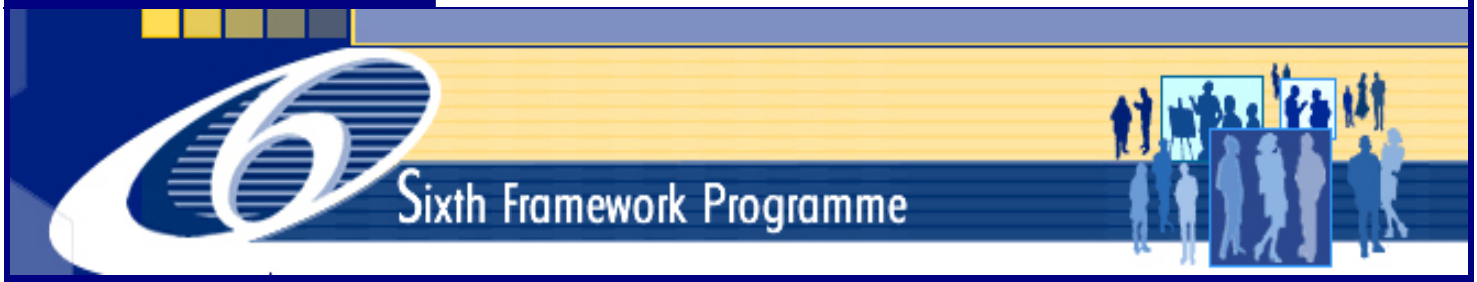
SAMCO also supports an initiative for an integrated project under the environment program. This will be coordinated by ENEL Hydro (please contact Mr. Alberto Peano, e-mail: peano.alberto@enel.it). The SAMCO facilities of the data exchange platform will be used. The 1st call is expected for mid December with a closing date early April 2003.

We wish our readers the best possible success in the 6th framework program.

Yours Co-ordinator
Helmut Wenzel

Contact

VCE Vienna Consulting Engineers
e-mail: vce@atnet.at



Evaluation of the SAMCO Workshop

The full results are available at www.samco.org/workshop

The 2nd SAMCO Workshop was held from 30.9.02 – 1.10.02 in the Novotel Centre Tour Noir in Brussels, Belgium.

Résumé: The participants received topical information from the European Commission and an impression how the projects for 6FP can be approached.

A definition of possible Integrated Projects was done and the creation of partnerships was induced. The proposal for an Integrated Project on structural assessment and health monitoring (E-MOI) under the leadership of Dr. Wenzel (VCE) was discussed in detail and contributions were received from the audience. An Integrated Project in the seismic field (ISRECS) was discussed under the leadership of Prof. Flesch (arsenal research). An initiative to cover the seismic field and active control was started. In particular the implementation of a Network of Excellence on active control was discussed. This subject will be headed by Prof. Casciati (UNIPV).

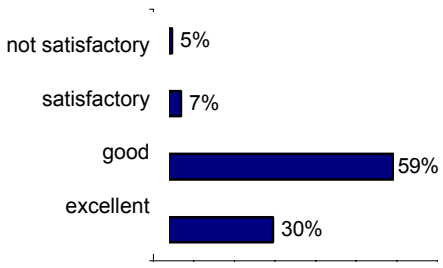
The forming of a bigger End User Forum was stimulated. A discussion on the end users' needs has been launched and shall be continued.

The workshop has been considered a big success and a great step forward towards the 6th European Framework Programme.

Participation: 93 persons attended the workshop, coming from 20 different nations. 45% of them are from *outside* of SAMCO. There was a significant majority of the research community (~75% of the participants) only 33% were End Users.

The workshop was "good": An evaluation of the workshop was carried out in which 50% of the participants took part. The workshop was altogether considered as "good". The average mark for the workshop was 1.9 - which is nearly equivalent to "good" (2.0).

Marking of the Workshop:



▲ Question 2:
"Please give the workshop a mark!"

The workshop mainly met the research community's interests: The interests of the researchers were much more satisfied than those of the end user community. Among the researchers the average mark was 1.6, i.e between *good and excellent*. The end users did not only mark the whole workshop worse (the average mark among them was 2.5, i.e between *satisfactory and good*). The end users were also not so satisfied with the coverage of the different areas within the workshop.

Good coverage of fields: The fields: state-of-the-art, end user needs, methodologies & technologies and research & development were "good covered", except of the end user needs, they were "satisfactory covered".

End user needs not well represented: Among the end users there was a considerable dissatisfaction with that coverage of the end user needs: 44% of them marked it with "not satisfactory". This is emphasized by the additional comments, where it was often expressed that the next workshop should focus more on the end user needs.

Receiving information seems to be important to the end users: The interest to make a contribution within the next workshop is quite high among the researchers, 55% of them would like to contribute. Only 33% of the end users have the same interest. As the majority is not interested in contribution within the next workshop, one can conclude that they expect to *receive* and not to disseminate information.

A strong interest for structural health monitoring: Summarizing the topics, which evaluators suggested for their contributions, it is noticed that there is a strong interest in structural health monitoring.

Very positive Comments were given concerning the organization of the workshop and the proposals for the integrated projects.

More information

http://www.samco.org/workshop
http://samdoc.jrc.it

The detailed evaluation results, as well as other documents from the workshop can be uploaded on/ downloaded from the SAMCO database.

▲ More pictures from the workshop can be downloaded from the Samco Database.

Towards Smart Bridge Inspection

Ageing infrastructure has become a major concern in western European countries. In France, roughly half of the bridge life cost is due to repairing and maintenance. Since many bridges were built in the sixties, health diagnostics and assessment of residual life already proves very important and will become crucial at the end of this decade.

To this end, systematic bridge inspection has been organized in France for a long time and well-defined visual observation and reporting tasks are periodically carried out on bridges. A status of bridge inspection in Europe is expected as an output of Samco. Current visual inspection involves a rather heavy logistics. A large platform mounted on a heavy truck is operated by a small team of highly specialized and often heroic inspectors, who work in extremely difficult and risky conditions, looking for small defects or damages in sometimes hardly accessible components of the structure. Of course, the bridge under inspection is usually closed to the traffic. This gives rise to a huge real economical cost of bridge inspection.

From the technical viewpoint, inspection includes a careful mapping of surface cracks of width equal to or larger than 1/10 mm. A special purpose device (*figure 1*) helps measuring crack length and width, the evolution of which is also of concern. But all possible defects are reported on.

Progresses in visual bridge inspection look possible in the direction of remote sensing and process automating. In this area, LCPC starts evaluating the practical interest of using unmanned aerial vehicles (UAVs) as camera carriers and image transmitters. The concept, although not new, may bring the enabling technology for remote and non-intruding bridge inspection, since inspectors may stay on the ground, or even very far away, and the bridge would *ultimately not be closed* to the traffic. The UAV may operate at a varying frequency depending on the needs of every bridge, and may use non-visual (infrared, radar,...) non destructive techniques thus enlarging

▲ Figure 1: Purpose Device

the range of current visual inspection and increasing the flexibility while decreasing a lot the economical and human cost of current bridge inspection.

As a first step, an on-site experiment (*figure2*) has been carried out with the help of a helicopter (*figure 3*) that has been flying few minutes around a viaduct in France, and taking a video from which some pictures have been extracted (*figure 4 and 5*). Large defects can clearly be detected, even without image processing. Of course, the helicopter must be driven by a highly skilled person and can neither fly out of visual reach of the operator nor get close to the structure. Moreover small cracks may not be detectable.

Therefore the next step will consist of a cooperative research and development effort within a national partnership aiming at investigating the stationary flight of a non-dangerous UAV of moderate sub metric size on the first hand, and at developing image processing techniques taking into account the kinematics of the carrier and various disturbances on the other hand. Longer term research and development may focus on the use of small-scale UAVs to inspect the interior of bridges.

Contact

François Derkx
Jean-Luc SORIN
Jean DUMOULIN
francois.derkx@lcpc.fr

Laboratoire Central des Ponts et Chaussées (LCPC)
58 Boulevard Lefebvre
75732 Paris Cedex 15
France

▲ Figure 2: On-Site Experiment

▲ Figure 3: Video Recording with a Model Helicopter

▲ Figure 4: Defects Detection on Photo

▲ Figure 5: Defects Detection on Photo

Company Profile

Building Research Establishment Limited

BRE is the UK's leading centre of expertise for buildings, construction, testing, fire and risk management, providing research, consultancy and information services to customers worldwide. This expertise is available to all in the construction and associated industries. BRE provides independent and authoritative advice relevant to every stage of the life cycle of a structure from design, through construction and use, to demolition and recycling.

Activities on the European level

BRE has considerable experience of activities at the European level. It has participated in over 140 collaborative European projects of which it has co-ordinated over 25. These projects have been in the range of programs including Energy, IT, Standards Measurements and Testing, Environment, Agriculture and Industrial and Materials Technologies.

BRE also participates in the progress of implementing the European Construction Products Directive (CPD) with BRE technical experts being members of over 150 CEN Technical Committees or Working Groups. BRE also assists the European Commission in the management of the process through the provision of Technical Secretariats.

The BRE Centre for Whole Life Performance

The Assessment of whole life performance and the cost of an asset over its lifetime takes into consideration initial capital costs and future costs, including operational costs, maintenance costs and replacement/disposal costs at the end of its life. It enables invest options to be evaluated more effectively be taking into account the impact of all costs, and permits optimization of construction spending and timing. BRE is the forefront of developing practice and processes in meeting new challenges. BRE holds large amounts of data on long-term performance and has well established reputation for both objectivity and rigor. Expertise on whole life performance encompasses BRE´s wide expertise based almost 80 years of research and consultancy.

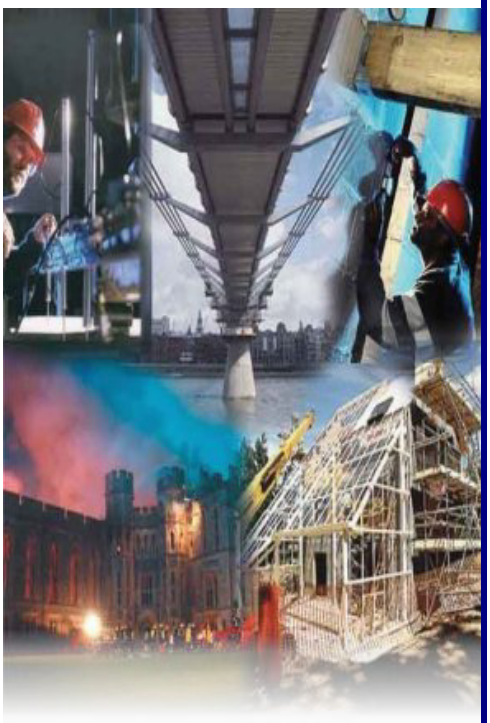
Activities and Services

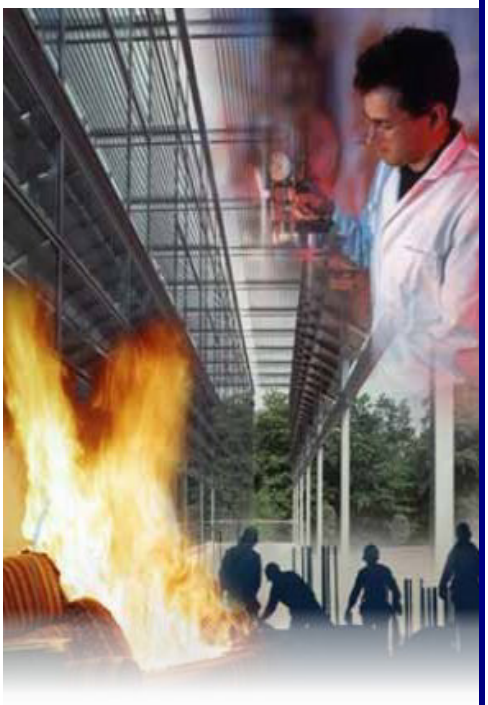
As a multidisciplinary consultancy its services are founded on, but not restricted to, the built environment. These include construction, from initial concept and design to demolition and disposal of building materials, and all aspects of the built environment including building services, health, comfort and productivity of building occupants, fire and risk sciences, product testing and approval, energy efficiency and sustainability.

The principal lines of BRE services are:

- Construction Solutions
- A Better Built Environment
- Asset Management
- Sustainability
- Fire and Risk Science
- Testing and Monitoring

BRE's 650 expert personnel operate from two UK sites equipped with world-class facilities. The headquarters site is near Watford in Hertfordshire, and BRE Scotland is located in East Kilbride.
BRE has 80 years of experience at the forefront of research and research-based consultancy for a wide range of clients across all sectors, which seek authoritative and impartial solutions to support innovation and resolve problems. Since 1997 BRE has been owned by the Foundation for the Built Environment, a non-profit-distributing organisation with a mission to champion excellence and innovation in the built environment.





Contact

Anna Kingsmill-Vellacott
vellacottka@bre.co.uk

BRE
Garston, Watford
Hertfordshire WD25 9XX
Telephone: 01923 664000
Fax: 1923 664010

More information

http://www.bre.co.uk

Strong Tremors Rock Italy

31 October – In dismay the whole of Europe was looking at Italy where heavy earthquakes claimed a huge number of victims. Several strong tremors shook central Italy, in particular the Italian town San Giuliano Di Puglia in southern Italy where 28 people, mostly schoolchildren, were killed by a collapsing school building. San Giuliano and three other neighbouring villages were evacuated after two strong aftershocks. Also the night to Saturday was afflicted by the heavy tremors in the central Italian region Molise. In the town Campobasso and in several other villages thousands of people left their houses to spend the night in tents.

Fault Lines in Italy

Since the major earthquake on Thursday with the magnitude of 5.4 the seismologists have registered more then 100 aftershocks. Thursday's earthquake had its epicentre near the central town of Casacalenda in the province of Campobasso (see picture beside). It is located on the route of an East-West fault, which is a result of tectonic movements underneath the Adriatic Sea. As a result of the movement of the European tectonic plate in a south-easterly direction, the Earth's crust had broken into smaller pieces, and the Adriatic Sea is sitting in one of those rocks. Preliminary moment-tensor solutions for this earthquake imply that the shock occurred as the result of movement on a strike-slip fault. The fault would be either a north-south, left-lateral fault or an east-west, right-lateral fault. Some geologists have hypothesized that a major component of the relative motion between the African plate and the Eurasian plate is accommodated on a north-south, left-lateral, boundary that passes near the epicentre of the earthquake. The boundary is thought to accommodate slips of 5 - 10 mm/year. The preliminary focal-mechanisms are consistent with this model. It is noteworthy, however, that many destructive earthquakes in Italy occur as the result of deformation of the earth's crust not related in a simple way to the present-day movements of the African and Eurasian plates. Until detailed studies of this earthquake are completed, hypotheses on the earthquake's relationship to large-scale plate-tectonic processes are speculative.

Earthquake History

The last strong earthquake in Italy happened in Umbria in 1997. Since the major earthquake of 1627, which devastated the central region of Gargano, Italy has acquired a reputation as being one of the most earthquake-prone countries in the world.

1997 - More than 40,000 people lost their homes and 13 died in a series of earthquakes in September. Four of the victims were killed as the roof of the Basilica of St Francis in Assisi collapsed. Priceless frescoes were also damaged.

1980 - 2,735 people were killed and more than 7,500 injured in a quake measuring at least 6.9 on the Richter scale. The epicentre was at Eboli, about 80 kilometres (50 miles) south of Naples, and damage was widespread. More than 1,500 people were reported missing.

1976 - An earthquake measuring 6.1 on the Richter scale rocked Friuli in northeastern Italy, killing 976 people and leaving 70,000 others homeless.

1915 - An earthquake shook southern Italy on 13 January. The town of Avezzano at its epicentre was completely destroyed. The death toll was estimated to be at least 30,000.

1908 - On 28 December Europe's most powerful earthquake struck the Messina Strait, which separates Sicily from Calabria.

The effects, combined with a large tsunami or tidal wave triggered by the earthquake, were devastating.

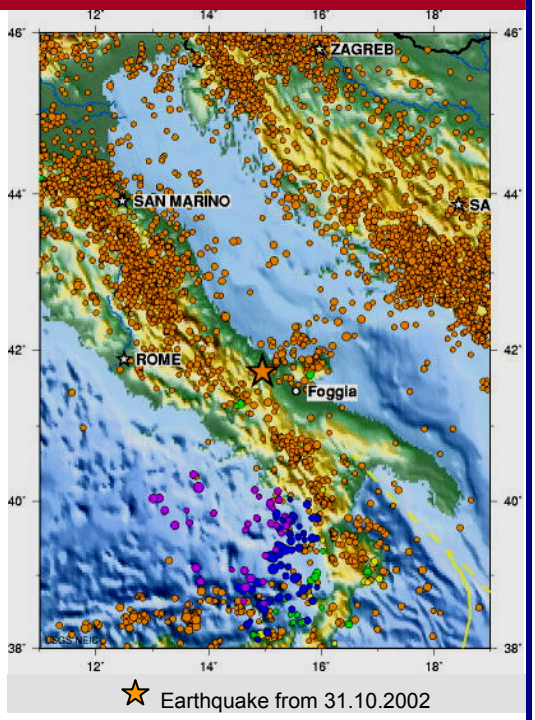
Estimates of fatalities vary, but may be as high as 200,000.

The quake's magnitude was equal to 7.5 on the modern Richter scale.

1905 - An earthquake obliterated 25 villages in the Calabria region, killing about 5,000 people.

1783 - Calabria on the southern tip of Italy was hit by an earthquake, killing about 50,000.

1693 - Earthquakes hit southern Italy, killing an estimated 60,000 in Catania, Sicily, and 93,000 in Naples.



▲ Seismicity from 1990 to present
© USGS National Earthquake Information Center

▲ Epicentre of the Earthquake from 31.10.02
© USGS National Earthquake Information Center

▲ Faults Causing Tectonic Movements
© USGS National Earthquake Information Center

Security Standards Disregarded?

Engineers now look into the reasons why the school building in San Giuliano, built in 1954, could collapse during the earthquake on Thursday. Normally a tremor with 5.4 should not make a building, designed according to modern standards, collapse.

The public prosecutors induced investigations. They are probing whether poor construction was to blame for the collapse while adjacent buildings remained standing. Investigating magistrates inspected the site on Saturday, November 2, and said their probe would look into the question whether manslaughter or negligence charges would be warranted.

News reports said a second storey had been added in recent years to incorporate the nursery, elementary and middle school classrooms. Heavy cement had been applied to the upper level, the reports said, suggesting the added weight may have helped to bring down the building.

The engineer, who designed the school renovations, told the ANSA news agency on Saturday, November 2, that he had added two classrooms - not an entire storey - onto the school structure and that the renovations had been done in complete conformity with regulations. He denied heavy cement had been used. Had the building been zoned as a quake-prone area, the renovations would have been carried out to a higher standard, he said.

At the last check in 1981 the town and the whole region Molise was not declared a quake-prone zone, particularly after the 1980 quake had killed nearly 3,000 people in the Naples area and left 30,000 people without home. Such a designation would have required stricter building codes in a part of Italy, where illegal, substandard construction is widespread.

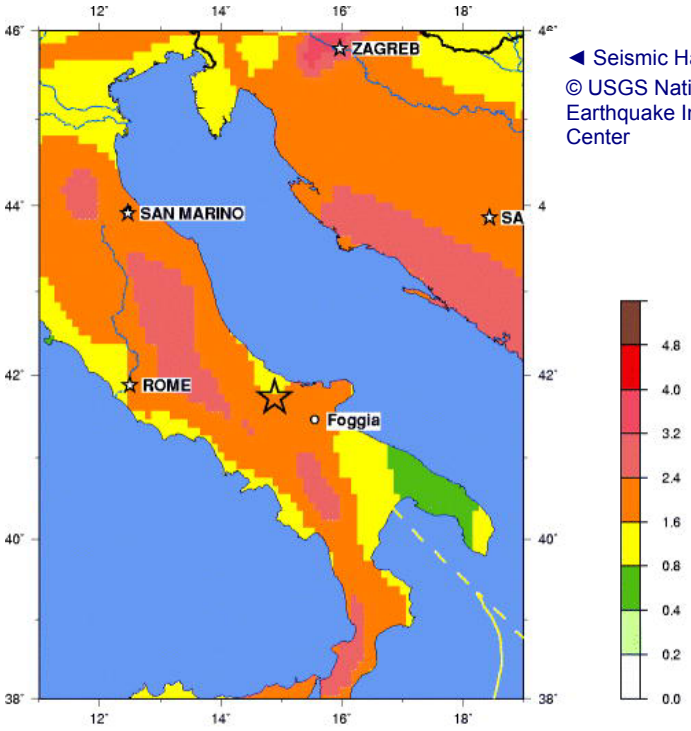
Sources

Earthquake News
http://www.earthquakenews.com

Worldwide Disaster Relief
http://www.disasterreliefs.org

National Earthquake Information Center
http://neic.usgs.gov/

BBC
http://www.bbc.co.uk



◄ Seismic Hazard Map
© USGS National Earthquake Information Center

SOUTHERN ITALY
2002 10 31 10:32:58 UTC 41.73N 14.89E Depth: 10.0 km, Magnitude: 5.9
Peak Ground Acceleration (m/s²) with 10% Probability of Exceedance in 50 Year
USGS National Earthquake Information Center

▲ San Giuliano, Italy

▲ Collapsed school building in San Giuliano, Italy

▲ San Giuliano and 3 other villages were evacuated

▲ San Giuliano and 3 other villages were evacuated

Announcements

8th World Seminar on Seismic Isolation, Energy Dissipation and Active Vibration Control of Structures

Date: October 6-10, 2003
Location: Yerevan, Armenia

Main Organizer:
American University of Armenia (AUA)

Main Co-Organizers:
- *A*nti-*S*eismic *S*ystems *I*nternational Soc*i*ety (*ASSIS*) and
- Armenian Association for Earthquake Engineering (AAEE)

The 8th World Seminar will again provide an opportunity for the exchange of updated, detailed information concerning the state-of-the-art on the development and applications of the innovative anti-seismic techniques. Similar to the previous events, topics covered by the Yerevan Seminar are base and floor isolation, passive energy dissipation, provisional hydraulic coupling and systems formed by shape memory alloys devices, as well as development and applications of active, semi-active and hybrid control of seismic and non-seismic vibrations and the critical issues concerning the application of innovative anti-seismic techniques in low and moderate seismic areas. In addition, topics on seismic input and codes for seismic isolation will be covered, as recommended at the Seminar in Assisi.

After Sessions containing general lectures on state-of-the-art on application and R&D, specific Oral Sessions will be devoted to lectures on the different kinds of structures of interest for application of the innovative anti-seismic techniques (namely: bridges and viaducts; strategic and important buildings such as hospitals, emergency management centres and schools; regular apartment buildings; cultural heritage; and high risk nuclear, chemical and other industrial plants). The main new ongoing R&D projects will also be presented in the Oral Sessions, while more specific but important topics concerning R&D and single applications will be presented in the Poster Session.

More information
http://web.aua.am/events/seminar/

5th International Symposium on Cable Dynamics

Date: September 15-18, 2003

Location: Grand Hotel Miramare in Santa Margherita Ligure, Italy.

Organizers:
- Politecnico di Milano
- University of Liege
- Association of Engineers graduated from the Montefiore Electrical Institute

This series of symposia is dedicated to cable structures and to interchange of ideas between several engineering disciplines relative to overhead electrical lines, guyed masts, cable-supported bridges, cables for marine applications, etc.
Scenarios to be considered for such structures are rupture e.g. by material fatigue and unacceptable or catastrophic response due to natural forces (of which some fraction may be motion-dependent).
The potential problems with cable structures are not easily handled because the loading process within a span is most often only vaguely known through interpretation of displacement response and because the effect of end-point motions is far from easy to predict.
Means for amelioration of the rate and magnitude of vibration occurrences is a central topic at this Symposium.
Computational Fluid Dynamics (CFD) is an additional topic for this 2003 Symposium. CFD applied to cable structures are probably not so much developed and any interesting contribution would be very much appreciated.

A half-day tutorial will be organized on Monday 15 September. It will be entitled Monitoring and Assessment of Cables.

Call for papers

Those wishing to offer a contribution should submit by 20 January 2003 a synopsis of up to 2 pages of A4 paper (400-500 words) in PDF format directly by e-mail to the Symposium Secretariat (info@aim.skynet.be). A template is available on the web site.

Contact: info@aim.skynet.be

More information
http://www.conf-aim.skynet.be/cable/

Detection of Abrupt Changes - Theory and Application

Download

The book by Michèle Basseville and Igor V. Nikiforov, previously published by Prentice-Hall, Inc. (ISBN 0-13-126780-9 - April 1993 - Englewood Cliffs, N.J.) may now (November 1998) be downloaded, using pdf or (compressed postcript) ps.gz files from here:
http://www.irisa.fr/sigma2/kniga/

Summary

Many monitoring problems can be stated as the problem of detecting a change in the parameters of a static or dynamic stochastic system. The main goal of this book is to describe a unified framework for the design and the performance analysis of the algorithms for solving these change detection problems. Also the book contains the key mathematical background necessary for this purpose. Finally links with the analytical redundancy approach to fault detection in linear systems are established.
We call abrupt change any change in the parameters of the system that occurs either instantaneously or at least very fast with respect to the sampling period of the measurements. Abrupt changes by no means refer to changes with large magnitude; on the contrary, in most applications the main problem is to detect small changes. Moreover, in some applications, the early warning of small - and not necessarily fast - changes is of crucial interest in order to avoid the economic or even catastrophic consequences that can result from an accumulation of such small changes. For example, small faults arising in the sensors of a navigation system can result, through the underlying integration, in serious errors in the estimated position of the plane. Another example is the early warning of small deviations from the normal operating conditions of an industrial process. The early detection of slight changes in the state of the process allows to plan in a more adequate manner the periods during which the process should be inspected and possibly repaired, and thus to reduce the exploitation costs.

Download
http://www.irisa.fr/sigma2/kniga/

Calendar Of Events

NOVEMBER 2002

18-26. Activities of the Asian Seismological Commission.
Kathmandu, Nepal.
URL: http://www.nset.org.np

20-22. International Conference on Design and Dynamic Behaviour of Footbridges.
Paris, France.
URL:
http://otua.org/footbridge/Default_eng.htm

DECEMBER 2002

9-11. Transport Solutions Europe02 ;
London, UK.
URL: http://www.iir-tse2002.com

10-13. ACI 5th International Conference: Innovation in Design with Emphasis on Seismic, Wind and Environmental Loading, Quality Control and Innovation in Materials/Hot Weather Concreting.
Cancun, Mexico
URL: http://www.aci-int.org

16-18. 12th Symposium on Earthquake Engineering,
Roorkee, India.

17-20. International Conference on Structural Composites for Infrastructure.
Aswan, Egypt.
URL: http://www.geocities.com/acm_egypt_2002

FEBRUARY 2002

3-6. IMAC Conference and Exposition on Structural Dynamics;
Kissimmee, Florida.
URL: http://www.sem.org

5-8. EERI Annual Meeting;
Portland, Oregon.
URL: http://www.eeri.org/news/Meetings/eerimeet.html

9-12. Grouting and Ground Treatment Conference;
New Orleans, CA.
URL: http://www.nzsee.org.nz/pcee

13-15. Pacific Conference on Earthquake Engineering;
Christchurch, New Zealand.
URL: http://www.nzsee.org.nz/pcee

JANUARY 2003

20-24. 1st international congress on construction history ;
Madrid, Spain.
URL: http //maria.aq.upm.es/construction-history/info.html

FEBRUARY 2003

18-20. Performance of construction materials in the new millennium;
Cairo, Egypt.
URL: http://www.ucalgary.ca/~icpm

MAY 2003

6-8. Concrete Structures in Seismic Regions;
Athens, Greece
URL: http://www.fib2003.gr

7-9. STREMAH 2003, Structural Studies, Repairs & Maintenance of Heritage Architecture;
Halkidiki, Greece
URL: http://www.wessex.ac.uk/conferences

12-14. Fourth International Conference on Earthquake Engineering and Seismology;
Tehran, Iran.
URL: http://www.iiees.ac.ir/see4/

JUNE 2003

2-5. ICWE International Conference on Wind Engineering; *Lubbock, Texas.*
URL: http://www.icwe.ttu.edu

9-12. Fourth International STESSA Conference – Behaviour of Steel Structures in Seismic Areas; *Naples, Italy.*
URL: http://www.stessa2003.unina.it/

JULY 2003

1-3. Structural faults and repair: extending the life of bridges;
London, UK.
URL: http://www.structuralfaultsandrepair.com

AUGUST 2003

22-29. IABSE Symposium, Structures for High-Speed Railway Transport;
Antwerp, Belgium.
URL:
http://www.iabse.ethz.ch/conferences/Antwerp/Antwerp.html

SEPTEMBER 2003

15-18. 5th Symposium on Cable Dynamics; *Santa Margherita, Italy.*
URL: http://www.conf-aim.skynet.be/cable/

Imprint

SAMCO News

SAMCO News is a digital newsletter accompanying the SAMCO Network. It is funded by the European Commission in the frame of the GROWTH project SAMCO CTG2-2000-33069. It is an information and communication platform for the participants of SAMCO. It is issued periodically every second month.

SAMCO News is available at
http://www.samco.org/news

Funding

The SAMCO Network is funded by the European Commission (http://europa.eu.int) within the *"Fifth European Framework Programme",FP5,* (http://www.cordis.lu/fp5) which covers Research, Technological Development (RTD) and Demonstration activities. FP5 has a multi-theme structure, consisting of Specific Programmes. These Specific Programmes are further divided into Horizontal Programmes and Thematic Programmes. One of these Thematic Programmes is the *"Competitive and Sustainable Growth"* Programme (http://www.cordis.lu/growth/) under which SAMCO is running.

SAMCO is running under the exact term:
CTG2-2000-33069
Shared-cost RTD and Demonstration project, Concerted Action/Thematic Network
Duration: 48 months

Publisher

VCE

Vienna Consulting Engineers

Hadikgasse 60
A-1140 Vienna, Austria
Phone: +43 1 897 53 39
Fax: +43 1 893 86 71
URL: http://www.vce.at

Managing director
Helmut Wenzel, vce@atnet.at

Layout and Editing
Bettina Geier , bgeier@vce.at

Contributions

to the newsletter
please send to bgeier@vce.at