

MINUTES

Meeting of the Committee on Optimal Structural Design

8 May 2000, 2:30-8:30pm

2000 Structures Congress & Exposition

Wyndham Franklin Plaza Hotel, Philadelphia, Pennsylvania USA

In attendance were (in alphabetical order):

- Jasbir Arora, University of Iowa;
- Scott Burns, (control group member), University of Illinois, Urbana-Champaign;
- Chun-Man Chan, Honk Kong University;
- Franklin Cheng, University of Missouri at Rolla;
- Allen Estes, U.S. Military Academy;
- Chris Foley, Marquette University;
- Dan Frangopol, (control group member), University of Colorado, Boulder;
- Hitoshi Furuta, Kansai University;
- Don Grierson, (chair), University of Waterloo;
- Rafiq Hasan, Post-doctoral associate, University of Waterloo;
- Santiago Hernandez, La Coruna University;
- Siavash Khajehpour, Ph.D candidate, University of Waterloo;
- Ali Memari, Pennsylvania State University;
- Colby Swan, (secretary), University of Iowa;
- Mark Voss, Ph.D candidate, Marquette University;
- Lisa Wang, California State Polytechnic University, Pomona;

1. CALL TO ORDER

The meeting was called to order at 2:30 p.m. by Don Grierson, who presided over the meeting. All members and guests in attendance were briefly introduced. Minutes from the preceding meeting of the committee (19 April 1999, New Orleans) were approved, and there was no new business arising from these minutes.

2. REPORT ON OSD TECHNICAL SESSIONS AT 2000 CONGRESS

The OSD Committee sponsored three technical sessions at the 2000 Structures Congress. These were:

1. *Case Studies in Optimal Design of Civil Infrastructure Systems*, chaired by Dan Frangopol;
2. *Recent Advances in Structural Optimization*, chaired by Scott Burns; and
3. *Optimal Performance-Based Design of Buildings: Practical Applications*, chaired by Don Grierson, Chun-Man Chan, and Lei Xu.

Dan Frangopol, Scott Burns, and Chun-Man Chan briefly summarized, respectively, the themes of these sessions and the papers being presented in each.

3. OSD TECHNICAL SESSIONS FOR 2001 STRUCTURES CONGRESS

In Fall 1999, the OSD Committee proposed two technical sessions for the 2001 Structures Congress. Of these a session co-sponsored by Don Grierson and Colby Swan on *Conceptual Design of Structural Systems* was accepted. The themes and planned papers for this technical session were briefly outlined by Colby Swan.

4. OSD SESSION PROPOSALS FOR 2002 STRUCTURES CONGRESS

The theme for the 2002 Structures Congress in Denver is *Performance Based Design*, and so session proposals tying into this theme might be more successful than those that do not. OSD technical session proposals for the 2002 Structures Congress are due to Don Grierson by 1 August 2000, who must then edit them and submit them to Jasbir Arora (chair of the Analysis & Computations Committee) by 1 October 2000. Jasbir must then further edit the session proposals and submit them to ASCE by 1 November 2000. Don Grierson noted that successful session proposals typically: (1) fit well with larger conference themes; (2) have four potential speakers identified with a brief abstract and title of each speaker's paper.

Following considerable discussion, eight possible technical session proposals were identified for further development by OSD members:

1. **Jasbir Arora**: A tutorial on structural optimization targeted for practicing structural engineers;
2. **Scott Burns**: Excerpts from the current State-of-the-Art volume in preparation by the OSD Committee;
3. **Santiago Hernandez**: Multi-disciplinary optimization of structures for constructability, aero-elasticity, and maintainability;
4. **Hitoshi Furuta**: Practical design optimization applications using genetic algorithms;
5. **Don Grierson**: Computational methods for performance-based design;
6. **Lisa Wang**: Structural reliability and/or life-cycle cost optimization;
7. **Alan Estes**: Optimization of bridge inspection and repair strategies for enhanced reliability;
8. **Frank Cheng**: Multi-objective optimization.

5. SPECIAL PRESENTATION AND ANNOUNCEMENTS

5.1 Special Presentation

For approximately one hour, Mark Voss, a Ph.D candidate at Marquette University working under the direction of Christopher Foley, gave a presentation on his research. The title of his presentation was "An Emergent Design System for Advanced Analysis." Mark recommended the following monographs as potentially interesting reading for committee members:

- Paradigms of Artificial Intelligence by Achim Hoffman, Spring (1998).
- Emergence: From Chaos to Order by John A. Holland, Perseus Books (1998).
- An Introduction to Neural Networks by Kevin Gurney, Routledge Press (1997).

5.2 Special Announcement

Hitoshi Furuta announced a call for papers in a special issue of the *Journal of Computer-Aided Civil and Infrastructure Engineering* that he and Professor Yuanxian Gu are organizing and editing. Topics of interest for this special issue include (but are not limited to):

- Shape and Topology Optimization;
- Optimization Using Emerging Computing Approaches;
- Multidisciplinary Optimization;
- Industrial Applications of Optimization Technology;
- Application of Soft Computing (i.e. neural networks, evolutionary computing, fuzzy logic); and
- Structural Control.

Original papers (which will be peer-reviewed) should be submitted by June 30, 2000 to either of the guest editors. For further information, contact Professor Hitoshi Furuta, Department of Informatics, Kansai University, 2-1-1, Ryozenji-cho, Takatsuki, Osaka 569-1096, Japan (furuta@kutc.kansai-u.ac.jp).

6. FUTURE DIRECTIONS and SPECIAL PROJECTS

6.1 Workshop on Tall Buildings

Don Grierson and Chun-Man Chan proposed the development of a workshop in Hong Kong on Tall Buildings during 2002. ASCE is willing to provide \$3K of funding to promote special projects such as this when undertaken by any of its technical committees. Chun-Man Chan briefly discussed the considerable amount of ongoing tall-building construction in Hong Kong, and the need and potential interest in such a workshop. Don Grierson sought and obtained approval from the committee to further explore this special project.

6.2 NATO Workshop

Santiago Hernandez brought up the possibility of organizing a NATO sponsored workshop on structural optimization. A potential theme or purpose of the workshop would be to bring together researchers in Structural Optimization with public officials (in Europe) in charge of large-scale building projects. Santiago will further explore the feasibility of this workshop. Chris Foley noted that AISC research committee members (of which he is one) might be interested in participating and/or organizing such a workshop.

6.3 OSD Committee Website

To this point in time, the OSD Committee does not have a website to publicize its activities and initiatives. Chris Foley and Mark Voss volunteered to explore the development and maintenance of a website for the OSD Committee.

6.4 Special Issue of JCACIE

Don Grierson proposed editing a special issue of the *Journal of Computer-Aided Civil and Infrastructure Engineering*. The starting basis for the special issue would be expanded versions of the papers presented in the session Don and Colby Swan are organizing for the 2001 Structures Congress (*Computational Conceptual Design of Structures*). Full-length papers from others active in this field would also be solicited.

6.5 The GECCO Conference

Scott Burns mentioned that he has been asked to investigate the possibility of a structural optimization track sponsored by OSD in an upcoming Genetic and Evolutionary Computation Conference (GECCO), perhaps in 2001 or 2002. Members can contact Scott for further details.

7. OTHER BUSINESS

7.1 New Membership in OSD Committee

Don Grierson encouraged existing members of OSD to bring in new members to the committee. General criteria for membership include:

- Have completed or are nearing completion of formal education;
- Strong interest in Structural Optimization; and
- Member of ASCE.

Dan Frangopol encouraged all members of OSD to become members of the Structural Engineering Institute (SEI), since when one becomes a member of SEI approximately 80% of dues go to the SEI to support activities pertaining to structural engineering.

At the OSD Committee meeting, the following submitted applications for membership:

1. Hitoshi Furuta, Kansai University;
2. Ali Memari, Penn State University;
3. Lisa Wang, California State Polytechnic University, Pomona.

7.2 Continuing Membership in OSD Committee

As of 9/30/00, Scott Burns will reach the conclusion of his second three year term as a member of OSD. Don Grierson will request a one-year extension of Scott's membership (through 9/30/01) so that he can complete the State-of-the-Art volume in preparation.

As of 9/30/00, the following will also have reached the conclusion of their second three-year terms on the OSD Committee, and Don Grierson will recommend that they be appointed to "friend of the OSD Committee" status:

- Chun-Man Chan; and
- Dan Frangopol.

As of 9/30/00, the following will have reached the conclusion of their first three-year terms on the OSD Committee, and will be recommended for appointment to second three-year terms:

- Santiago Hernandez;
- Colby Swan; and
- Lei Xu.

One-year extensions as “members” of the OSD Committee are being recommended, commencing 10/1/00, for:

- K. Truman;
- M. Iordanescu; and
- S. Rajan.

8. CURRENT BUSINESS: STATE OF ART REPORT

Scott Burns led an extensive discussion on the State-of-the-Art volume being developed by the OSD Committee. The following guidelines regarding contributions to this volume were noted:

- Each contribution should feature a good balance between a review of the relevant literature, and a presentation of methods in that contribution area. The draft submitted by Shahram Pezeshk and Charles Camp was cited as an excellent example featuring such balance.
- The target audience of this special volume will be engineers and researchers working in the area of structural optimization.
- This volume should represent the state-of-the-art in structural optimization. Therefore, each paper should be quite broad and not overly focused on the contributions of authors.
- The volume will be published as a stand alone book (committee report) to be submitted to the TAC (Technical Advisory Committee) Chair and the Executive Committee of the SEI. The report will be published as a collection of full-length state-of-the-art papers on the designated topics. Both a paper and CD version of the report will be published.
- Updated drafts of each paper should be submitted to Scott Burns by November 1, 2000.
- New contributions to the volume should be submitted to Scott Burns by August 1, 2000.
- The basic format of submitted contributions should be that of ASCE Conference papers, although the length of each contribution can be considerably longer, at up to 30 pages.

The remaining time was devoted to discussing and providing preliminary feedback on the contributions submitted to Scott Burns thus far, namely:

- Jasbir Arora;
- Rick Balling;
- Chun-Man Chan;
- Dan Frangopol *et al*;
- Don Grierson and Siavash Khajepour;
- J.A. Jurado and Santiago Hernandez;
- Shahram Pezeshk and Charles Camp;
- Makoto Ohsaki and Colby Swan;
- Y.M. Xie *et al*;
- Lei Xu.

Authors not present can contact Scott Burns for a summary of discussion on their articles.

Frank Cheng requested that his 2001 Structures Congress paper with Dan Li and Jeffrey Ger, “Multiobjective Optimization of Seismic Structures,” be treated as a draft of his contribution to the volume. Also, Hitoshi Furuta mentioned that he is considering contributing a chapter on the state of the art in cable-tensioning of cable-stayed bridges.

9. ADJOURNMENT

At the conclusion of this discussion, the meeting was adjourned for continued discussions and dinner at *Bookbinders* in Philadelphia.

Respectfully submitted,

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