

**American Society of Civil Engineers  
Structural Engineering Institute  
Technical Committee on Optimal Structural Design**

**Approved Meeting Minutes  
2010 ASCE-SEI Structures Congress  
Gaylord Palms Convention Center – Orlando, Florida  
Emerald 4 Meeting Room  
Thursday, May 13, 2010; 9:00 am - 12:00 pm**

**Members in Attendance**

Arzhang Alimoradi (AE-JSE)	John A. Martin/USC	arzhang@members.asce.org
Asghar Bhatti	University of Iowa	mabhatti@uiowa.edu
Jamie Guest (Secretary)	Johns Hopkins University	jkguest@jhu.edu
Michael Gustafson	Tekla	Michael.gustafson@tekla.com
John Peronto	Thornton Tomasetti, Inc.	JPeronto@thorntontomasetti.com
Shahram Pezeshk (Past Chair)	University of Memphis	spezeshk@memphis.edu
Colby C. Swan (Chair)	University of Iowa	colby-swan@uiowa.edu

**Visitors (and Friends) in Attendance**

Rick Balling	Brigham Young University	balling@byu.edu
Chun-Man Chan	HKUST	cecmchan@ust.hk
Chris Foley (Past Chair)	Marquette University	chris.foley@marguette.edu
Santiago Hernandez	University de Coruna	
Kapil Khandelwal	University of Notre Dame	kapil.khandelwal@nd.edu
Keith Mueller	Teng and Associates	muellerkm@teng.com

The meeting was called to order at 9:08 AM by Chair (Prof. Swan).

**1. Introductions (Members, Friends, Guests)**

Committee members, friends, and guests provided brief introductions.

**2. Approval of Minutes from 2009 Meeting in Austin, TX**

The minutes of the annual meeting at the Austin congress were approved without amendment.

**3. Review and Update of Membership Roster**

Committee membership stands at 16 members. A number of members will have their terms expire in 2010. Visitors (and Friends) interested in joining (re-joining) the committee were encouraged to email the chair. Prospective committee members should first be members of ASCE in good standing.

#### 4. Associate Editor's Report

Dr. Arzhang Alimoradi discussed the papers he has handled since October 2009 (Prof. Swan was AE for the first four months following the April 2009 Austin meeting). Dr. Alimoradi has received 14 manuscripts (12 unique) – the breakdown is as follows:

- 7 papers are presently in review
- 3 papers have been accepted
- 2 papers have been rejected (1 without review)

The average review time from submission to acceptance was 10 months. The system is now managed online which has helped reduce time in review. Dr. Alimoradi stated that the acceptance rate is down slightly from 10 years ago. Two common problems he has noticed is that authors (1) do not consider realistic structural systems and/or (2) projected improvements are within standard design tolerances (e.g., 5%). The balance between presentation/derivation of a novel methodology and its validation on detailed systems was briefly discussed. Mr. Peronto stated that papers discussing structural optimization tools with low barriers to implementation were particularly attractive to practitioners. Requiring designers to learn or rely on new software was not feasible and thus papers with 'plug-in' tools were of interest.

The latest impact factor for *Journal of Structural Engineering* was reported to be 0.79 and Dr. Alimoradi circulated a recent assessment of other technical journals in the area of structural engineering and optimization - highlighted journals included *Computer Methods in Applied Mechanics and Engineering* (2.13) and *Int. J. for Numerical Methods in Engineering* (2.23). The OSD reviewed this listing and expressed some concerns with regard to the *Journal of Structural Engineering's* impact factor. The Chair stressed the importance of authors including adequate literature reviews in papers and of timely reviews as the age of referenced papers is one of the important metrics that defines the impact factor. Reducing review time will also attract new authors, particularly junior faculty.

The importance of finding willing and qualified reviewers was discussed. The committee recognized that this was a challenging job and thanked Dr. Alimoradi for his continued hard work. It was also noted that paper titles play an important role in assigning papers to AE's, and consequently reviewers.

#### 5. Discussion of OSD-organized Sessions at 2010 Congress

The Chair reviewed the two OSD-organized Sessions at the current Congress in the Analysis and Computation Track. The sessions were titled *State of the Art and Future Challenges in Structural Optimization*, both scheduled for later in the afternoon. Each session contained three papers as follows (Presenter, \* meeting participant):

*State of the Art and Future Challenges in Structural Optimization – Part 1*

- *Reinforced Concrete Design with Topology Optimization* (Jamie Guest\* and Cris Moen)
- *Optimal Wind Resistant Performance-Based Design of Tall Buildings* (Chun-Man Chan\* and Mingfeng Huang)

- *Control-based Structural Optimization: A Framework for Non-linear Topology Optimization* (Kapil Khandelwal\* and Andres Tovar)

*State of the Art and Future Challenges in Structural Optimization – Part 2*

- *Challenges and Advances in System Reliability Based Optimization of Structural Topology* (Junho Song, Tam Nguyen, Glaucio Paulino)
- *Benchmark Problems in Structural Design and Performance Optimization: Past, Present, and Future - Part I* (Arzhang Alimoradi\*, Chris Foley\*, Shahram Pezeshk\*)
- *Consideration of Practical Design Issues in Formulating Structural Optimization for Design Automation* (Michael Gustafson\*)

It was noted that five of the presenters (7 authors total) were at the OSD meeting. The Chair thanked the session organizers for their efforts.

## **6. Tentative Session Proposals for 2011 Congress in Las Vegas**

The Committee discussed potential topics for OSD-organized sessions at the 2011 Structures Congress in Las Vegas. The following three topics were discussed in detail: (1) Structural optimization in practice, (2) Continuum topology optimization for structural design, and (3) Structural optimization under model and parameter uncertainties. It was suggested that the committee prepare proposals for topics (1) and (2), and that topic (3) be discussed further in next year's OSD meeting as a potential session in the 2012 Congress. Peronto (lead), Chan, and Hernandez will develop the proposal for topic (1) and Swan (lead) and Guest will develop the proposal for topic (2). The deadline for session proposals is June 14, 2010, and requires an abstract and list of likely speakers. It was emphasized that the proposers should do their best to secure commitments from potential speakers. The inclusion of software companies in this, and other committee activities, was strongly encouraged.

### **Action Items**

*A. John Peronto will draft an abstract for a session on Structural optimization in practice and solicit feedback from Chun-Man Chan, Santiago Hernandez, and Chairman Swan. Potential speakers should be identified. Final proposal is due June 14, 2010.*

*B. Chairman Swan will draft an abstract for a session on Continuum topology optimization and solicit feedback from Jamie Guest. Potential speakers should be identified. Final proposal is due June 14, 2010.*

## **7. Discussion of Old and New Initiatives:**

The committee discussed old, pending, and new initiatives and was reminded that funding is available on a competitive basis from the Technical Activities Division for new initiatives (about \$3,000-\$8,000 for white papers, special projects, reports, etc.). The following old and new business was discussed.

**a. Performance-Based Optimal Design publication (2006 minutes)**

This effort did not materialize and contributions were released to the authors.

**b. Benchmark Problems**

Arzhang Alimoradi summarized the discussion from 2009 OSD meeting regarding benchmark problems in structural optimization and updated the Committee on his efforts in this area. The goal is to develop a set of modern benchmark/challenge problems to encourage academicians to tackle more realistic structural systems and to persuade practitioners to adopt available techniques in structural optimization for their designs. Dr. Alimoradi was presenting later in the day on the topic in the *State of the Art and Future Challenges in Structural Optimization –Part 2* session and briefly summarized his talk. Two potential benchmark problems were presented: (1) Plastic design of mid-rise moment frame under dynamic loads and (2) Reinforced concrete multi-story core wall structure for construction cost. The Committee was referred to Dr. Alimoradi's paper in the conference proceedings and the structural optimization wiki ([structuraloptimization.wikispaces.com/Benchmarks](http://structuraloptimization.wikispaces.com/Benchmarks)) for additional details.

The Committee largely supported this effort and offered the following comments and suggestions.

- Non-building structures, such as bridges of varying spans, should also be considered.
- Solutions to the benchmark problems should be provided.
- The Structural Control Committee is undergoing a similar effort for control problems and have organized a session on benchmarks at the current Congress and potentially a Special Issue for *J. of Structural Engineering*. We should review their efforts to improve ours.
- Benchmark problems must be rigorously vetted by the committee to minimize the need for future revisions that may discourage engineers from considering them.
- Including construction modeling would enhance the cost benefit and potentially attract contractors to join the effort.
- The Committee discussed at length the issue of modeling assumptions in complex, nonlinear benchmark problems. Given the same input data, it is reasonable to expect users to compute different structural responses, and consequently different optimal solutions. The assumed governing mechanics must be clearly defined for the benchmark problems, but modeling discrepancies were viewed as unavoidable.

The Committee felt it worthwhile to move ahead with this effort.

**Action Items**

*Arzhang Alimoradi will work with Chairman Swan to form a subcommittee to further develop a suite of benchmark problems. Chun-Man Chan, Santiago Hernandez, and Keith Mueller were identified as potential members of this subcommittee.*

**c. Student paper competition**

This topic was tabled for discussion offline due to time constraints.

**8. Technical Presentations**

Presentation by Jamie Guest was postponed due to time constraints.

The meeting was adjourned at 12:00 pm.

Respectfully Submitted,



James K. Guest, Ph.D.  
Secretary, Technical Committee on Optimal Structural Design  
May 18, 2010