ASCE Structural Health Monitoring and Control (SHMC) Committee Meeting

Chair: Satish Nagarajaiah, Rice Univ., Houston, Texas Vice Chair: Erik Johnson, Univ. of Southern California, Los Angeles, California Secretary: Jerome Lynch, Univ. of Michigan, Ann Arbor, Michigan <u>http://www.ruf.rice.edu/~nagaraja/Structural Health Monitoring & Control Committee</u> <u>ASCE-Eng-Mech-Division.htm</u>

4th World Conference in Structural Control and Monitoring (4WCSCM) June 11, 2006, 5:30-6:30pm, University of California-San Diego, San Diego, CA

| Meeting attendance: | | |
|---------------------|-----------------------------------|---------------------------|
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1. Welcome

Prof. Satish Nagarajaiah, chair of the SHMC committee called the meeting to order. He welcomed those members and visitors in attendance and requested those interested but not already members to sign up for membership in the committee. The procedure for joining the committee includes the need to fill out a membership form with CV. However, the prospective applicant must be members of ASCE or members of the Engineering Mechanics Institute (EMI). Currently, the committee consists of 38 members. Prof. Satish Nagarajaiah announced that his term as chair will end in 2006 and Prof. Eric Johnson would take over as the new chair for a two year term.

2. Review of benchmark problem completed

The first phase (Phase I) of the Smart Base Isolated Benchmark Problem has now been completed. The benchmark problem was recently published in a special double issue of the Journal of Structural Control and Health Monitoring (Vol. 13, No. 2-3). In total, 15 papers from the international community have been published.

3. Review of benchmark problems in-progress

The second phase (Phase II) of the Smart Base Isolated Benchmark Problem is focused on nonlinear isolation strategies and near-field effects. Currently, there is a call for papers for a special issue of the Journal of Structural Control and Health Monitoring to be edited by Prof. Satish Nagarajaiah (Rice), Prof. Erik Johnson (USC), and Prof. Sriram Narasimhan (Waterloo). Community members interested in contributing are able to download MATLAB code for the benchmark problem from the committee website. A deadline of March 30, 2007 has been set for submission of papers.

A new benchmark problem on Highway Bridge Control is currently available. The first phase of the benchmark (Phase I) is focused on the control of a highway bridge with the bridge deck connected to the outriggers. The second phase (Phase II) is defined by the deck being isolated from the outriggers. A special is being considered by the editors of the Journal of Structural Control and Health Monitoring to be edited by Prof. Anil Agrawal (CCNY) and Prof. Satish Nagarajaiah (Rice).

Prof. Necati Catbas (UCF), Prof. Juan Caicedo (University of South Carolina), and Prof. Shirley Dyke (Washington University) are currently in the planning stages of a benchmark problem in structural health monitoring of highway bridges. A physical test-bed has been constructed and an analytical model released.

4. The future of benchmark problems

Benchmark problems have served the structural control and health monitoring communities well since the mid-1990's. Their role has been to promote control technologies and to assist researchers in assessing their algorithms. The SHMC committee would like to consider new structural health monitoring benchmarks, based on the suggestion by Prof. Bill Iwan (Caltech), which is the concept of a blind prediction problem. Prof. Iwan has also proposed the use of a student competition as part of future blind prediction problems. The blind prediction problem would hold back information on some of the damage cases to allow researchers to blindly apply their damage detection algorithms.

5. Open discussions

With that, Prof. Satish Nagarajaiah opened the floor to a general discussion to the possible formulation of blind prediction problems. The main points discussed were as follows.

(1) SHMC committee should clearly define what is meant by a blind prediction problem.

(2) Recent health monitoring benchmark problem has been conducted based on a steel structure constructed and tested by Prof. Carlos Ventura (UBC). But, the damage scenarios were disclosed. As a result, the benchmark had a few open cases with damage information disclosed; they also had a few where it was not disclosed. The result was about a half dozen papers published. The intent of the blind prediction was to avoid allowing researchers to "tune" their algorithms to the problem.

(3) One suggestion was to tie a future benchmark problem or blind prediction problem to practice, for example, government officials who inspect bridges normally rate their bridges. A blind prognosis problem should draw on these practices. For example, can the problem address life cycle costs, etc.

(4) One area where there is a need for more work by our community is on prognosis. For a future effort, SHMC committee should take a lead on formulating a blind prognosis benchmark problem.

(5) Perhaps there are some opportunities to dovetail into the NEES infrastructure for formulation of a damage prognosis/blind prediction problem.

(6) There might also be some opportunities for our community to collaborate with Japan; particularly with the E-defense facility. Another idea is to have a future benchmark problem as part of the outreach portion of future grand challenge proposals.

(7) There are opportunities with getting some payload projects within NEES. There is a current NEES project on soil-structure interaction. Already, this simple structure has yielded changes in modal properties simply due to environmental factors like temperature and water table height. Other opportunities might be the use of the UCSD outdoor shaking table to capture environmental variability.

At 6:30pm, Prof. Satish Nagarajaiah officially closed the meeting.

Respectfully Submitted Prof. Jerome P. Lynch, Secretary