

Adaptive Structures Control Competition at the 16th AIAA Adaptive Structures Conference April 2008 Chicago, IL

Concept - A relatively simple, adaptive structure is available for researchers to come up with compensators that will be competed against a performance metric. The baseline structure is fully characterized and details are available. The baseline structure will be changed by the addition of a mystery impedance that will dramatically change its transfer functions during the competition. Researchers will design & test compensators that must adapt to the new plant as part of the competition.

Primary Objective - Provide a hardware platform for competitive demonstration of control on an adaptive structure.

Secondary Objective – Energize interest in Adaptive Structures Conference by providing a fun venue for presenting, sharing, and demonstrating adaptive control concepts.

The winner will receive \$1000 and the runner-up will receive \$500 prize

The shootout will be a session at the 16th Adaptive Structures Conference, April 2008, Chicago, IL. Abstracts (intent to compete) are due August 2007.

The event will consist of:

Pre-competition familiarization & tuning opportunity (15 min -TBR) with baseline hardware at the conference (expect plant to change slightly from published characterization)

Competition

- a) Open loop benchmark RMS calculated for each competitor
- b) Demonstrate participant's controller with 10 sec (TBR) for ID & auto-tuning prior to loop-closure on baseline structure.
- c) Add mystery impedance to the baseline structure to initiate new compensator with 10 sec (TBR) to adapt.
- d) Demonstrate participant's controller with 10 sec (TBR) for ID & auto-tuning prior to loop-closure on the modified structure.
- e) Performance Criteria calculated:

$$P = 2P_1 + P_2$$

$$P_1 = \frac{RMS_{CL}(Baseline)}{RMS_{OL}(Baseline)} < 1.05$$

$$P_2 = \frac{RMS_{CL}(w/Impedance)}{RMS_{OL}(w/Impedance)} < 1.05$$

where the 1.05 upper bound is an instability disqualification threshold.

[For more details, download competition package by clicking this text](#)