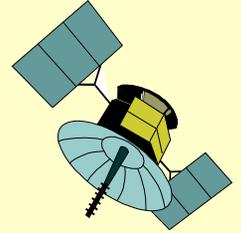


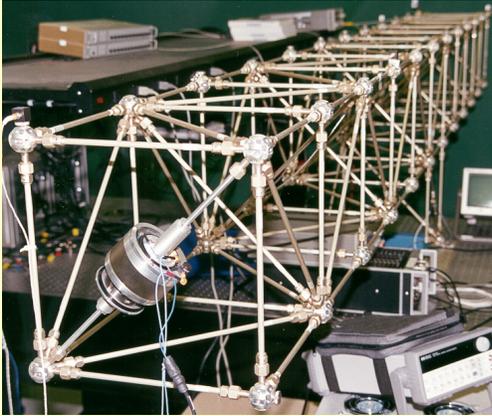


# Spacecraft Research & Design Center

Department of Aeronautics and Astronautics  
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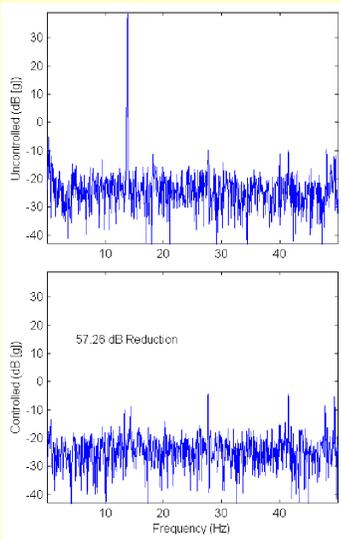


## NPS Space Truss



**Objective: To develop control algorithms for active structural vibration control and vibration suppression.**

- The overall dimension of the truss is 3.76 m long, 0.35m wide, and 0.7 m tall.
- Two piezoelectric struts are used as control actuators, at the base of the truss.
- Disturbance source is a Linear Proof Mass Actuator at near-end of truss.



The placement of active elements in the truss structure allows for either active vibration damping of the space truss or vibration suppression at a specific location. Both approaches are being studied on the NPS Space Truss. Finite Element Modeling of the truss also allows for the evaluation of an analytical prediction of the effectiveness of new vibration control systems.

The Adaptive Multi-Layer LMS control algorithm has demonstrated a 57 dB reduction in the nodal acceleration power distribution spectrum.

### Theses

1. T. A. Barney, *Adaptive Multi-Layer LMS Controller Design and Its Application to Active Vibration Suppression on a Space Truss*, Master's Thesis, NPS, Monterey, California, June 2001.
2. C. M. Pantling, *Active Vibration Control Method for Space Truss Using Piezoelectric Actuators and Finite Elements*, Master's Thesis, NPS, Monterey, California, December 1999.
3. S. E. Johnson and J. Vlattas, *Modal Analysis and Active Vibration Control of the Naval Postgraduate School Space Truss*, Master's Thesis, NPS, Monterey, California, June 1998.
4. B. K. Andberg, "Modal Testing and Analysis of the NPS Space Truss," Master's Thesis, NPS, Monterey, California, September 1997.

### Publication

1. G. Song, J. Vlattas, S. Johnson, and B. N. Agrawal, "Active Vibration Control of A Space Truss Using PZT Stack Actuator," ASME International Mechanical Engineering Congress and Exposition, Nashville, TN, 1999.

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