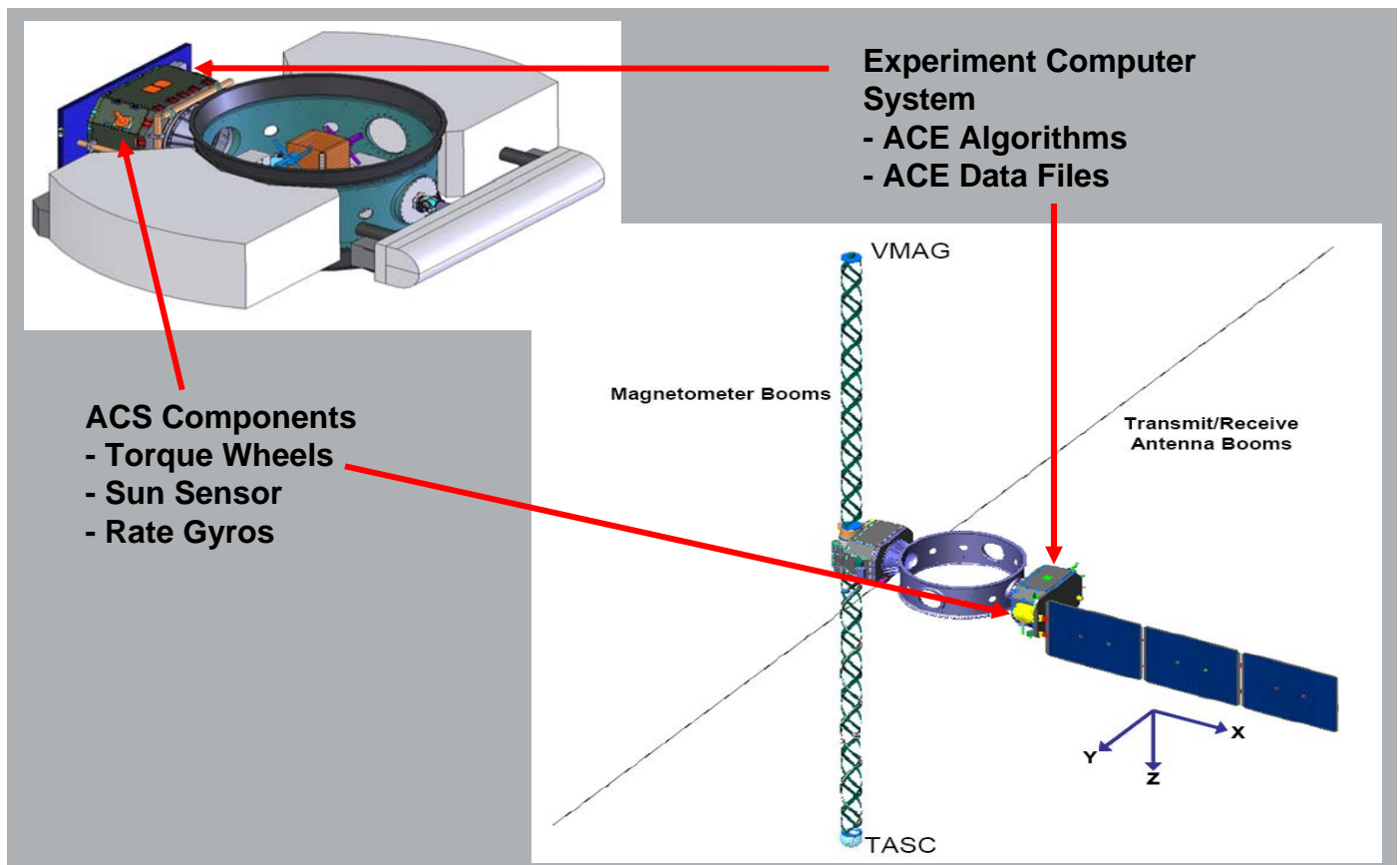


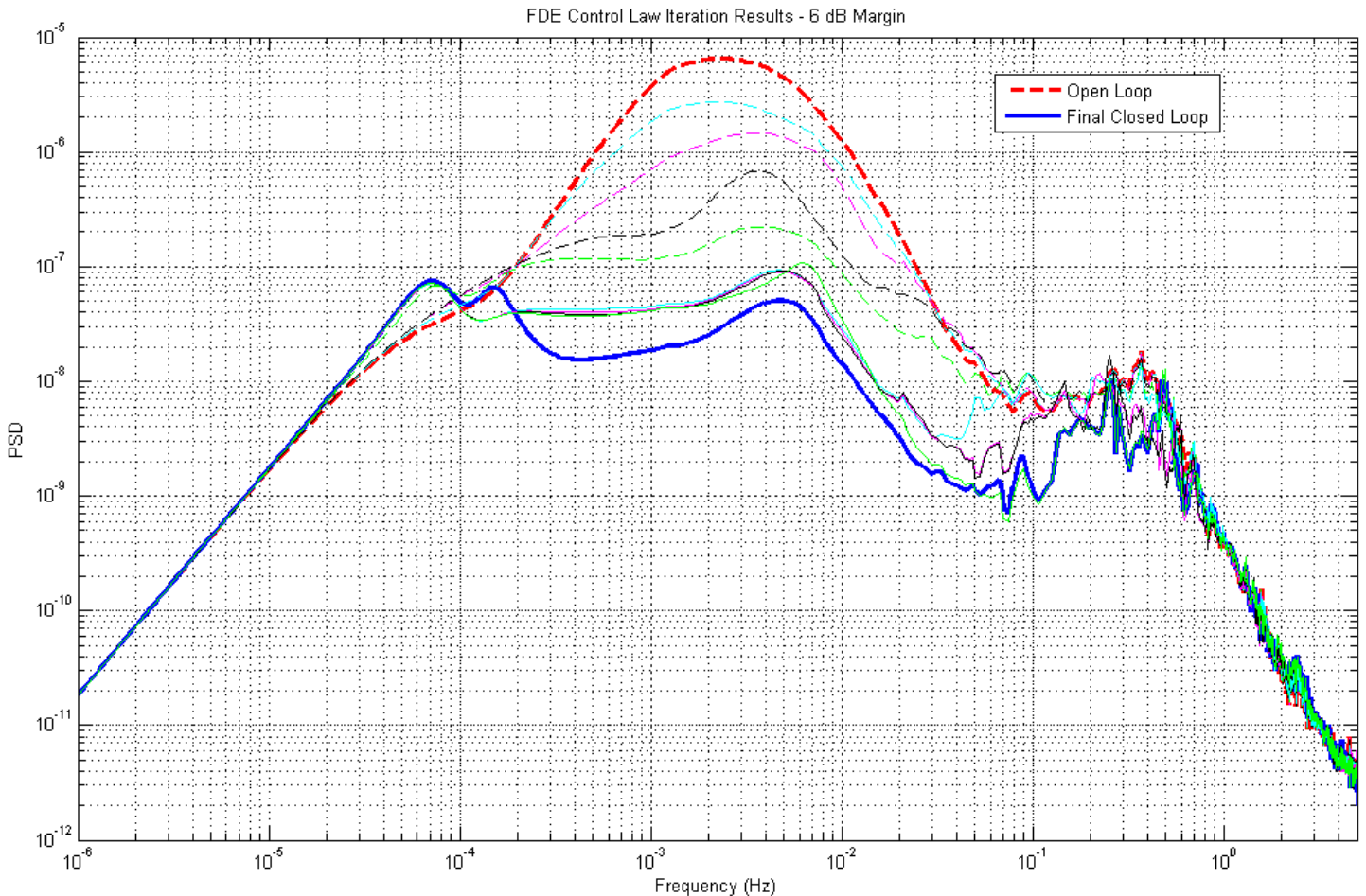
# Frequency Domain Expert

Technology for Autonomously Measuring and Controlling Deployable Space Structures Having Flexible Modes

Spacecraft flexible modes make attitude control difficult, limiting the bandwidth of control. This has a direct effect on operational speed and efficiency. The **Frequency Domain Expert (FDE)** was developed to redesign the spacecraft attitude control law in orbit. FDE measures the system frequency response autonomously and designs a series of control filters to attenuate performance violations and maintain stability. Then, as necessary, system identification and redesign are revisited to maintain optimum performance over changing conditions. FDE is scheduled to be implemented on the Adaptive Control Experiment for the Demonstration and Science Experiments (DSX) satellite.



The Demonstration and Science Experiments (DSX) Spacecraft



### Example Results of FDE

- Each step better than the last
- Each step meets stability margin guarantees and fits within available computation limit
- Middeck Active Control Experiment (MACE II) on the International Space Station
  - Demonstrated on-orbit ID, design, & performance improvement autonomously
  - Demonstrated autonomous recovery from simulated sensor/actuator failures
  - Demonstrated time/money budget savings by reducing modeling and testing requirements
  - Demonstrated successful adaptive algorithm w/limited computational power consistent w/space applications



**For more information contact:**  
 Larry Davis, Planning Systems Incorporated  
 1901 S. Harbor City Blvd., Suite 700a, Melbourne, FL 32901  
 Tel. (321) 768-6500, Fax: (321) 768-0525