RQ17-31

High Frequency Load Measurements of Slender Bodies in Unsteady Flow Fields

1. **Research Title:** High Frequency Load Measurements of Slender Bodies in Unsteady Flow Fields
2. **Individual Sponsor:** List the AFRL research topic sponsor's contact information

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3. **Academic Area/Field and Education Level:** Aerospace and/or Mechanical Engineering (MS or Ph.D. level)
4. **Objectives:** Develop high frequency non-intrusive pressure measuring methods for measuring unsteady loads on slender body stores in an unsteady cavity environment.
5. **Description:** To determine the cause of store separation anomalies from weapons bays, dynamic store balance measurements are required to accurately measure unsteady store loads in wind tunnels. A small cavity model scale increases forcing frequency while store/balance inertia limits traditional balance load response, which could result in inaccurate balance load measurements. High frequency non-intrusive pressure measuring methods could increase the data accuracy and frequency range over traditional store balances measuring methods, and could help determine the root cause of store separation anomalies when stores are released from weapons bays. The Aerospace Systems Directorate program "Rapid Assessment of Weapons Separation (RAWS) is attempting to measure store load as they traverse thru a weapons bay flow field using traditional store balance techniques. Proposed work would be primarily experimental and (1) consist of measuring the forces induced on a slender body using a traditional balance method and comparing the loads to high speed non-intrusive pressure measuring methods, in an unsteady non-cavity environment, (2) using high speed non-intrusive pressure measuring methods measure the forces on a slender body in a cavity, (3) investigate methods at reducing the cavity unsteady forcing function and measure the resulting load reductions on the store.
6. **Research Classification/Restrictions:** This research is at the public-release (Distribution Statement "A") level, with intent to publish in the open literature.
7. **Eligible Research Institutions:** Indicate to what organizations this topic should be provided.

[✖] **DAGSI** (Wright State University, AFIT, Ohio State University, University of Dayton, Miami University, Ohio University, University of Cincinnati).