1. **Research Title:** Correcting Structural Calibration Data to Enable High Frequency Force Measurements

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 methods to correct air-off structural calibration data to account for inconsistencies with air-on structural response during wind tunnel testing

5. **Description:** High frequency experimental unsteady force measurements are an exciting new technology with direct application to numerous aerodynamic problems including weapons separation and hypersonic research. However, this capability is predicated on the acquisition of representative structural data. If a system's structural response characteristics are known, then that information can be used to determine the applied forcing that would cause a given response. Unfortunately, it is challenging to obtain an accurate structural characterization due to changes between the calibration (still-air) and air-on (tunnel running) environments due to several causes: 1) small changes in model positioning and assembly, such as those associated with the collection of pitch or roll sweeps 2) Aeroelastic effects such as aerodynamic stiffening and/or damping. While these effects do not dramatically change the structural response characteristics, these modest shifts amplitude, frequency and phase can undermine the accuracy of unsteady force measurements. Due to model and sting sizing constraints, (long, slender stings) these issues cannot be fully designed out of a system. Methods to quantify the sources of and account for the structural mismatch are sought under this topic. Air-on data is assumed to be known. Approaches could include but are not limited to: 1) correction of pre-existing structural data to match air-on structural characteristics, 2) rapid post-test tuning of structural system to match air-on structural characteristics. Computational methods may be useful, but the overall objective is to successfully apply any developed methods to experimental data sets. Ultimate application of the techniques is intended to be used with slender stings in larger wind tunnels including the 2 ft by 2ft TGF facility, but small university test rigs and sample problems are encouraged for initial proof of concept.

6. **Research Classification/Restrictions:** This research unclassified, with intent to publish in the open literature.

7. **Eligible Research Institutions:** All DAGSI Universities.

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