RQ21-82

1. **Research Title: S**tructural Dynamics, Mechanics and Material Assessment for Improved Turbine Engine Design and Sustainment

2. **Individual Sponsor:**

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3. **Academic Area/Field and Education Level:** Mechanical Engineering, Material Engineering, or Aerospace Engineering (MS and/or PhD level)

4. **Objectives:** Develop advanced experimental or analytical approaches for the accurate assessment and sustainment of turbine engine component life. The research can be directed towards, but not limited to, improved bench experimentation, novel design and manufacturing techniques, innovative component fatigue and fracture models at elevated temperatures, or improved dynamic response prediction for rotors.

5. **Description:** The viability of future and current gas turbine engines hinge on improved understanding of analytical and experimental structural assessment methods as well as component design practices. For future systems, the demand for more structurally complex components has increased with the advancements of materials and manufacturing techniques. Current turbine engine systems face growing cost in sustainment due to lack of repair feasibility and obsolesce of spare components. To address the challenges with future and current turbine engines, this research topic aims to nurture advances in structural assessment and design techniques. The associated research activities shall take place in the Turbine Engine Fatigue Facility (TEFF) and/or with the Structural Analysis Group (SAG) of the Turbine Engine Integrity Branch. The unique experimental capabilities in the TEFF consists of traveling wave excitation (TWE), servohydraulic loadframes, electrodynamic and piezoelectric shakers, ultrasonic fatigue systems, advanced laser vibrometry, digital image correlation (DIC) full-field strain measurement, digital microscopy, and blue light geometric metrology. The SAG specializes in developing probabilistic structural assessment models for predictive component responses under static and dynamic loading such as fracture, fatigue, mistuning, and computational fluid dynamics; SAG models often serve as a bridge between simplified, low-cost laboratory experiments and operational turbine engines.

6. **Research Classification/Restrictions:** Open to U.S. citizens only. Some aspects of this research may include ITAR restrictions.

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

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