

1. **Research Title:** Ultra-Compact Combustion
2. **Individual Sponsor:**
Dr. Andrew Caswell, AFRL/RQTC
2130 Eighth Street
WPAFB, OH 45433-7542
andrew.caswell.4@us.af.mil
3. **Academic Area/Field and Education Level:** Aerospace Engineering / Mechanical Engineering / Chemical Engineering / Engineering Physics (MS or PhD level)
4. **Objectives:** Research and develop innovative gas turbine combustors with efficient flame holding to improve performance and fuel efficiency as governed by decreased specific fuel consumption, total pressure loss and pollutant emissions. Design, develop, model, test, and characterize the combustion system.
5. **Description:** To meet the gas turbine engine propulsion requirements of future advanced military aircrafts, the engine components must be developed to operate at conditions well beyond modern day technology. This includes design considerations of weight savings, improved operating characteristics and efficient integration and packaging to meet the performance goals. Combustor components should be designed to deliver the maximum amount of heat release while providing low pollutant emissions and specific fuel consumption. Conventional gas turbine combustion systems have inlet guide vanes, a diffuser, array of fuel injectors, cooling circuits, heat exchangers, and exit guide vanes. To realize performance gains of increased thrust-to-weight ratio while maintaining affordability, advanced gas turbine combustors need to be designed, developed and evaluated with advanced fuel injection, improved fuel-air mixing technologies and efficient front end design. The ease of adapting these changes, without unduly altering the current engine flow path is needed. Therefore the purpose of this effort is two-fold: (1) Identifying combustion system improvements based on existing and revolutionary hybrid combustor concepts that can include traditional and nontraditional technologies, and (2) Apply numerical analysis and testing methodology for the suggested concepts to assess in-depth performance gains while maintaining perspective of overall combustor performance.
6. **Research Classification/Restrictions:** Open to U.S. citizens only. Some aspects of this research may include ITAR restrictions.
7. **Eligible Research Institutions:**



DAGSI (Wright State University, AFIT, Ohio State University, University of Dayton, Miami University, Ohio University, University of Cincinnati). NOTE: Topics submitted to DAGSI must be approved for public release. PA Approval # 88ABW-2014-3663



AFIT (only)

USAFA (only)

If you are submitting a topic for the USAFA, indicate if you are also interested in sponsoring a USAF Cadet in summer 2015 (Average cost for USAF Cadet for 33 days is \$5000)

Yes

No