RQ17-19

Continuously Variable Wing and Camber Morphing Structure Design Analysis: Aerodynamic and Control Allocation Study for Efficiency and Flight Performance

1. **Research Title:** Continuously Variable Wing and Camber Morphing Structure Design Analysis: Aerodynamic and Control Allocation Study for Efficiency and Flight Performance
2. **Individual Sponsor:**

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3. **Academic Area/Field and Education Level:** Aerospace or Mechanical Engineering (MS or Ph.D. level).
4. **Objectives:** Research and analyze the aerodynamic performance of a continuously variable wing and camber morphing structure that maneuvers without using a discrete control surface system (e.g. ailerons or flaps).
5. **Description:** Removal of traditional control surfaces could provide large benefits such as enhanced maneuverability, decreased structural weight, maximized mission range, and increased survivability. AFRL is interested in proposals that address these potential vehicle improvements using CFD analysis, shape optimization, and/or wind tunnel test. Examples of specific research areas include, but should not be limited to: 1) understand the 3D aerodynamics of continuously variable wing and camber morphing structure; 2) evaluate the benefit of the conformal wing system compared to a conventional wing system with discrete control surface system (e.g. ailerons or flaps) in terms of efficiency, flight control effectiveness, fuel consumption, and so on; 3) increase vehicle range and/or flight performance by modifying wing characteristics in flight such as a continuous camber shape optimization with different flight condition during a flight; 4) control allocation for optimization or balance of sub objectives such as aerodynamic efficiency, structural loading, and maneuverability 5) verify the benefits and performance using wind tunnel test.
6. **Research Classification/Restrictions:** None.
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).