Research Objective

- Computational and experimental investigation of aeromechanics for rotorcraft and unmanned aerial systems
- Research will enable development of Army’s first ever rotorcraft capable of supersonic speeds

Challenges

- VTOL designs so far have been unable to increase top speed without unacceptable compromises in range, efficiency, and useful payload
- Active/passive technologies for flow control and structural shape control to minimize performance trade-off penalties in different flight regimes

ARL Facilities and Capabilities Available to Support Collaborative Research

- Access to High Performance Computing resources along with several modeling and simulations tools
- Rotorcraft aeromechanics comprehensive analysis packages (CAMRAD and RCAS)
- Rotorcraft CFD/CSD simulation packages (Helios)
- Ducted rotor test stand for simultaneous measurement of duct and rotor forces
- Personnel with over 100 years of combined research experience in rotorcraft aeromechanics, design and analysis
- Computational tools and low speed wind-tunnel aerodynamics research on micro autonomous systems
- Transonic dynamics tunnel for Mach-scaled wind-tunnel tests
- Multi-disciplinary design optimization for rotorcraft concepts
- Rotorcraft flight simulators for virtual flight demonstrations of aeromechanics technologies
- Facility for flight experimentation of small unmanned aerial vehicles (UAVs)

Complementary Expertise/ Facilities/ Capabilities Sought in Collaboration

- Co-axial rotor test stand for experiments on rotor in hovering flights
- Wind-tunnel for rotorcraft scaled experimental research with a test section area greater than 50 sq ft and capable of speeds more than a 0.2 Mach number
- Anechoic chamber for rotor aero-acoustics experiments
- Capability for active flow control experiments using plasma
- Expertise in active shape morphing for structures
- Expertise and capability in shape memory alloys for morphing rotor concepts
- Water towing tank for aerodynamics research