ScMvr-19

Rotorcraft Capability Assessment and Tradeoff Environment

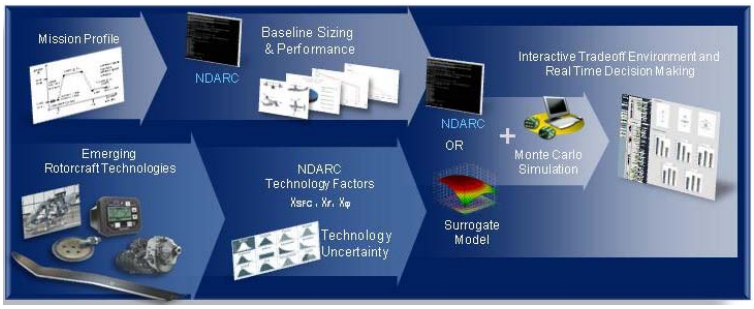
S&T Campaign: Sciences for Maneuver
Platform Mechanics

Eric Spero, (410) 278-8743, eric.spero.civ@mail.mil
Rajneesh Singh, Ph.D., (410) 278-4022, rajneesh.k.singh.civ@mail.mil

Research Objective

Through development of an interactive capability tradeoff process and decision-making environment:

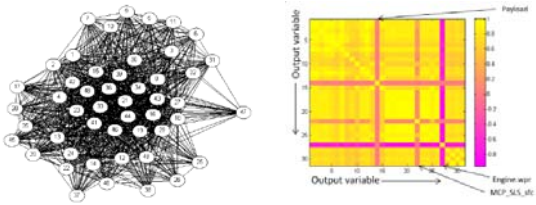
- Assess system-level impact of rotorcraft technologies
- Recommend portfolios based on multiple objectives
- Understand the relationship between technology attributes and system capability gaps



Technology Insertion Analysis in Rotorcraft Conceptual Design

Challenges

- Accurate technology representation in a modeling environment
- Inclusion of mission effectiveness, reliability, and cost in a quantitative tradespace
- Model fidelity and multivariable mapping
- Tracking and controlling uncertainty propagation through the design process



Variable Partitioning and Ranking Challenging due to Interdependencies

Interactive Technology Selection and Technology Portfolio Frontiers

ARL Facilities and Capabilities Available to Support Collaborative Research

- Access to High Performance Computing facilities
- Access to multifidelity rotorcraft conceptual design tools
- Access to rotorcraft technology subject matter experts

Status

- An initial interactive, rapid, visual trade-off environment has been created
- Small set of technologies translated into model inputs using calibration factors from literature and SMEs
- Approach and tool verified; validation path forward
- Technology portfolios recommended to user based on min/max objectives

Related Publications and Presentations

- Arruda J, Gavrilovski A, Ahn B, Chae H-G, Spero E, Mavris DN. The Capability Assessment and Tradeoff Environment (CATE) for Advanced Aerospace Vehicle and Technology Assessment. Procedia Computer Science. 2014;28(CSER 2014).
- Spero E, Bloebaum CL, German BL, Pyster A, Ross AM. A Research Agenda for Tradespace Exploration and Analysis of Engineered Resilient Systems. Procedia Computer Science. 2014;28(CSER 2014).
- Rigas EJ, Spero E. Systems Tradespace Analysis: Assessment of Current Capabilities and Future Directions. 15th Annual NDIA Systems Engineering Conference; 24 October 2012; San Diego, CA: NDIA; 2012.
- Arruda J, Hamel L, Collins K. A Method for Quantitative Technology Analysis of Active Rotor Technologies. AHS 67th Annual Forum; 3-5 May 2011; Virginia Beach, VA: AHS; 2011. [ARL Sponsored]

Complementary Expertise/Facilities/ Capabilities Sought in Collaboration

- Development of interactive, web-based applications
- Application of statistical techniques to quantify technology impacts based on empirical data
- Multiple stakeholder interactions and value negotiation
- Incorporation of higher fidelity modeling and simulation into rotorcraft conceptual design and capability trades
- Reliability analysis of rotorcraft propulsion components linked to conceptual design process and tools
- Advanced technology modeling and representation techniques