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# aerospace engineering and engineering mechanics

PLEASE POST

**ASE & EM DEPARTMENT SEMINAR**

FRIDAY, MAY 4<sup>th</sup>, 2001  
3:00 PM Rieveschl Hall 821B

**Battle Management and Control of Military Operations**  
The DARPA JFACC Program

**Major Sharon A. Heise, Ph.D.**

Traditional approaches to military Command and Control (C2) have considered the C2 organization itself as the primary object of study. The DARPA JFACC program has instead focused on how best to model and control the dynamics of entities in the battlespace in order to achieve desirable outcomes. The JFACC hypothesis is that control science – its mathematical methods and associated modeling techniques – offers a powerful approach to dynamic planning and replanning for the highly complex problem domain of military air operations. A variety of techniques have been investigated in this program, including game theory, linear approximations, stochastic optimization, and Model Predictive Control. Selected experimental results are highlighted, as well as possible future directions.

Major Sharon A. Heise, U.S. Air Force, is a Program Manager in the Information Technology Office of the Defense Advanced Research Projects Agency (DARPA), the Department of Defense's primary R&D organization specializing in high risk, high payoff research and located in Arlington, Virginia. Upon Major Heise's arrival at DARPA she managed the final 8 months of the Joint Force Air Component Commander (JFACC) program, which applied feedback control theory to dynamic planning and replanning for military air operations. Major Heise also initiated and currently manages the Mixed Initiative Control of Automa-teams (MICA) program, which examines hierarchical battle management and control of teamed semi-autonomous entities.

In Major Heise's previous assignments, she developed flight control methods for super maneuverable aircraft, hypervelocity vehicles and large space structures at the Air Force Research Laboratory, Dayton, Ohio. She also taught multivariable control theory on the faculty of the Air Force Institute of Technology in Dayton, and led a satellite prototype branch at the National Reconnaissance Office, Chantilly, Virginia. Major Heise received a B.S. degree in aeronautics and astronautics from the University of Washington in 1986. She earned an M.S. degree in astronautical engineering from the Air Force Institute of Technology in 1987, and the Ph.D. degree in control engineering from Cambridge University, England, in 1995.