Abstract form

(Nordic Military Operational Research Symposium)

Subject: Influence Diagram Game Modeling of Maneuvering Decisions in One-on-one Air Combat
Name(s): Kai Virtanen, Janne Karelahti, Tuomas Raivio, and Raimo P. Hämäläinen
Organization: Systems Analysis Laboratory, Helsinki University of Technology
Email: kai.virtanen@hut.fi

Abstract: (Max 100 words)

The paper describes a multistage influence diagram game for modeling the maneuvering decisions of pilots in one-on-one air combat. It graphically describes the elements of the decision process, contains a model for the dynamics of the aircraft, and takes into account the pilots' preferences under conditions of uncertainty. The pilots' game optimal control sequences with respect to their preference models are obtained by solving the influence diagram game with a moving horizon control approach. In this approach, the time horizon of the original game is truncated, and a feedback Nash equilibrium of the dynamic game lasting only a limited planning horizon is determined and implemented at each decision stage. To demonstrate the influence diagram game and its aspects, examples with a three-dimensional point mass aircraft model are computed and analyzed. The presented game model offers a novel way to analyze optimal air combat maneuvering and to develop an automated decision making system for selecting combat maneuvers in air combat simulators.