This thesis proposes and evaluates a new cooperative guidance law called Cooperative General Vector Explicit — Impact Time and Angle Control Guidance (GENEX-ITACG). The motivation for GENEX-ITACG came from an explicit trajectory shaping guidance law called General Vector Explicit Guidance (GENEX). GENEX simultaneously achieves design specifications on miss distance and terminal missile approach angle while also providing a design parameter that adjusts the aggressiveness of this approach angle. Encouraged by the applicability of this user parameter, GENEX-ITACG is an extension that allows a salvo of missiles to cooperatively achieve the same objectives of GENEX against a stationary target through the incorporation of a cooperative trajectory shaping guidance law called Impact Time and Angle Control Guidance (ITACG).

ITACG allows a salvo of missile to simultaneously hit a stationary target at a prescribed impact angle and impact time. This prescribed impact time is what allows each missile involved in the salvo attack to simultaneously arrived at the target with unique approach angles, which greatly increases the probability of success against well defended targets. GENEX-ITACG further increases this probability of kill by allowing each missile to approach the target with a unique approach angle rate through a user design parameter.

The incorporation of ITACG into GENEX is accomplished through the use of linear optimal control by casting the cost function of GENEX into the formulation of ITACG. The feasibility GENEX-ITACG is demonstrated across scenarios that demonstrate the ITACG portion of the guidance law, the the GENEX portion of the guidance law, and finally the entirety of the guidance law. The results indicate that GENEX-ITACG is able to successfully guide a salvo of missiles to simultaneously hit a stationary at a user defined terminal impact angle and time while also allowing the user to adjust the aggressiveness of approach.

Major: Electrical Engineering

Educational Career:
Bachelor's of Electrical Engineering, BS, 2012, University of Central Florida
Master's of Industrial Engineering, MS, 2014, University of Florida

Committee in Charge:
Zhihua, Qu, Chair, EECS
Yunjun, Xu, Professor
Aman, Behal, Professor

Approved for distribution by Zhihua, Qu, Committee Chair, on April 23, 2016.

The public is welcome to attend.