Bancha Upanan 2012: The Study of Mathematical Modeling and Computational Formation Flight Simulation of UAVs. Master of Engineering (Aerospace Engineering), Major Field: Aerospace Engineering, Department of Aerospace Engineering. Thesis Advisor: Squadron Leader Sukon Puntunan, Ph.D. 70 pages.

The objectives of this research are to study UAVs formation flight including controlling of UAVs and mathematical theories related to the formation flight, to design the mathematical model of UAVs formation flight and to develop the automatic control system for UAVs formation flight using PID controllers, developed in C# programming language. Then simulate controlling of UAVs formation flight by Microsoft Flight Simulator X. The UAVs models used in the simulation are 3 General Atomic MQ-1 Predator UAVs which fly in a Leader-Follower formation with many shapes including V formation, Spread formation, Edge formation, Trail formation and Spread formation with different height.

The result shows that the automatic control system for UAVs formation flight created from the designed mathematic model can manipulate all UAVs while keeping the required formation flight.

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