# Altitude control of flying objects using fuzzy theory and hedge algebra with adjusted semantics

**Ngo Thi Kim Anh**

**Abstract:** This thesis presents a novel approach to altitude control for aerial vehicles by integrating fuzzy logic and hedge algebra with adjusted semantics. Traditional control methods often struggle with the nonlinearities and uncertainties inherent in flight dynamics, particularly during critical descent maneuvers. To address these challenges, a hybrid controller is developed that leverages the linguistic interpretability of fuzzy systems and the formal reasoning capabilities of hedge algebras. The key innovation lies in the application of adjusted semantic parameters within the hedge algebra framework, enabling more precise and adaptive control responses without exhaustive rule tuning. The proposed controller is designed to manage altitude reduction smoothly while maintaining stability and robustness against external disturbances. Simulation results demonstrate that the hybrid approach outperforms conventional fuzzy and PID controllers in terms of response time, overshoot reduction, and steady-state error. This work provides a promising foundation for intelligent flight control systems, offering enhanced performance and reliability for autonomous aerial vehicles in complex operational environments.

**Keywords:** fuzzy control, hedge algebra, altitude control, semantic correction