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Trajectory Estimation of Amphibious Aircraft Using H-Infinity and Ensemble Kalman Filter Methods

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Abstract: An amphibious aircraft is an aircraft that has the ability to operate from a runway like a conventional aircraft or from shallow water. Such type of aircraft is widely used for tourist transportation, taking tourists to areas only reachable by water. It is not uncommon for amphibious aircraft to be used as rescue and forest fire fighting tools. The need for amphibious aircraft is in line with the development of navigation and guidance systems required by such amphibious aircraft. Navigation and motion control systems for amphibious aircraft refer to technologies and systems allowing aircraft to operate in the air and also sail on the water surface. Amphibious aircrafts are designed to have capabilities that allow them to take off and land on conventional runways and to operate to and from water area. Several navigation guidance methods in the field of robotics can also be used, one of which is for amphibious aircraft position estimation. The accuracy of aircraft position estimation is very important to ensure that the amphibious aircraft follows the specified trajectory accurately. The estimation methods used in this paper are the H-infinity and Ensemble Kalman Filter (EnKF). This study compared the numerical simulation results of the two methods, EnKF and H-infinity, aiming to estimate the position of the amphibious aircraft by generating 300 and 600 ensembles, and the simulation results with 800 ensembles had the best accuracy of about 95-98%.

Keywords: *amphibious aircraft; trajectory estimation; H-infinity and Ensemble Kalman Filter methods.*

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