Nonlinear Dynamics and Systems Theory, **26** (2) (2026) 173–183

Advanced Kalman Filter Implementation for Estimating Yaw Coefficient in Amphibious Plane Motion Experiments

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Received: December 17, 2025; Revised: March 24, 2026

Abstract: Indonesia is a maritime country with a larger ocean area than land. This issue must be addressed with proper supporting transportation that serves as both a method of mobilization and defence. Amphibious planes are versatile modes of transportation that are suitable for usage in Indonesian coastal areas. Amphibious aircraft are equipped with a navigation system and technology to move both in the air and on water. The amphibious aircraft's mobility is also engineered to allow it to take off and land on its intended trajectory. Several approaches have been developed to calculate the amphibious aircraft's trajectory. These approaches are continuously refined to achieve the desired level of accuracy. The commonly used estimation calculation methods are the Ensemble Kalman Filter and the Kalman Filter. The Ensemble Kalman Filter method is a development of the Kalman Filter which can be used to estimate linear and non-linear system models. The Kalman Filter is the forerunner of the Ensemble Kalman Filter method which can only be used to estimate linear dynamic system models. The Ensemble Kalman Filter method successfully obtained the best prediction error value with an RMSE value of 0.0876 with a total of 400 ensembles. Meanwhile, the Kalman Filter method successfully obtained the best prediction error value with an RMSE value of 0.000237.

Keywords: *amphibious plane; trajectory estimation; ensemble Kalman filter; Kalman filter.*

Mathematics Subject Classification (2020): 93E11, 93C41, 60G35.

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