



Estimation of Pitch Angle and Heave Position of Remotely Operated Vehicle Using Linear Quadratic Gaussian

A. Suryowinoto¹, T. Herlambang^{2*}, P. Triwinanto³, Y. A. Prabowo¹,
D. Rahmalia⁴ and M. S. Baital⁵

¹ *Electrical Engineering Department, Adhi Tama Institute of Technology, Indonesia.*

² *Department of Information System, Universitas Nahdlatul Ulama Surabaya, Indonesia.*

³ *National Research and Innovation Agency, Indonesia.*

⁴ *Department of Mathematics, University of Islam Darul Ulum, Indonesia.*

⁵ *Shipbuilding Construction Engineering Technology, Vocational School, Diponegoro University.*

Received: July 21, 2024; Revised: May 20, 2025

Abstract: In a Remotely Operated Vehicle (ROV), there are six degrees of freedom: surge, sway, heave, roll, pitch, and yaw. In linear motions, there are surge, sway and heave. In angular rotations, there are roll, pitch and yaw. In practice, there are disturbances and noise in the linear motion and angular rotation in their measurements. Therefore, in this research, the estimation of pitch angle and heave position of a ROV will be carried out by Linear Quadratic Gaussian (LQG). LQG is used for optimal control when there are disturbance input and measurement noise in the plant model. From the simulation, the estimation of the state solution and optimal control with various noise can be compared by LQG.

Keywords: *ROV; pitch angle; heave position; LQG.*

Mathematics Subject Classification (2020): 37N35, 49N10.

* Corresponding author: <mailto:teguh@unusa.ac.id>