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Research Article

Design and Stability Analysis of an Aerosonde UAV Using Linear Quadratic Regulator Control

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Abstract

Unmanned Aerial Vehicles (UAVs) have become increasingly important in surveillance, environmental monitoring, mapping, and scientific research, where flight stability and control performance are essential for safe and reliable operation. This study focuses on the modeling and stability analysis of an Aerosonde UAV using a Linear Quadratic Regulator (LQR) control approach. The main objective is to develop an optimal state-feedback controller capable of improving the stability and dynamic response of the UAV. A mathematical model of the Aerosonde UAV is established using longitudinal and lateral-directional flight dynamics and represented in state-space form. The LQR controller is designed by minimizing a quadratic performance index that balances state regulation and control effort through appropriate weighting matrices. The resulting feedback gains are applied to the longitudinal and lateral dynamic models, and numerical simulations are performed to compare the uncontrolled and LQR-controlled responses. The simulation results show that the LQR controller significantly improves the dynamic behavior of the UAV by reducing oscillations, decreasing overshoot, and accelerating convergence toward the equilibrium conditions. In the longitudinal dynamics, the controlled responses of velocity, vertical motion, pitch rate, altitude, and pitch angle exhibit improved stability compared with the uncontrolled system. Similarly, the lateral-directional responses demonstrate improved damping and faster convergence for lateral velocity, roll rate, yaw rate, roll angle, and yaw angle. These results confirm that the proposed LQR approach provides an effective state-feedback control strategy for improving the stability and dynamic performance of the Aerosonde UAV. The study provides a foundation for future investigations involving robust, adaptive, or intelligent control techniques under external disturbances and model uncertainties.

Keywords

Unmanned Aerial Vehicle, Aerosonde UAV, Linear Quadratic Regulator, Flight Control, Stability Analysis, State Space Model

1. Introduction

Unmanned Aerial Vehicles (UAVs) have become increasingly important in a wide range of applications, including surveillance, environmental monitoring, mapping, scientific research, and autonomous operations. For fixed-wing UAVs,

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maintaining flight stability and achieving satisfactory dynamic performance are essential for safe and reliable operation. The development of appropriate mathematical models and control strategies is therefore an important aspect of UAV research [1, 2, 4].

The Aerosonde is a fixed-wing UAV that has been widely considered in studies of aircraft dynamics, modeling, and control. Accurate mathematical modeling of the aircraft dynamics is essential for developing controllers capable of maintaining stable flight under different operating conditions [2, 4-6]. In particular, state-space representations provide a suitable framework for analyzing the longitudinal and lateral-directional dynamics of aircraft and for designing state-feedback controllers.

Several control approaches have been developed to improve UAV stability and flight performance. Classical techniques such as Proportional-Integral-Derivative (PID) control remain widely used because of their simplicity and ease of implementation. However, optimal and advanced control methods have attracted increasing attention because they can provide improved transient response and stability for multivariable UAV systems [3, 7, 8]. Recent studies have investigated LQR-based and hybrid control strategies for UAV attitude and altitude regulation, demonstrating their applicability to different flight-control problems [9, 10]. In addition, recent research on fixed-wing UAVs has compared several control strategies, including PID, Model Reference Adaptive Control (MRAC), LQR, and Linear Quadratic Gaussian (LQG), for both longitudinal and lateral flight dynamics [11].

The Linear Quadratic Regulator (LQR) is an optimal state-feedback control technique that is particularly suitable for systems represented in state-space form. The method determines an optimal feedback gain by minimizing a quadratic cost function that balances the regulation of system states and the control effort [3, 7, 8]. Its relatively simple formulation and ability to handle multivariable systems make it attractive for UAV flight-control applications. Recent research has further investigated LQR-based and hybrid LQR approaches to improve UAV stability, attitude regulation, and robustness under disturbances and model variations [9, 10, 12].

Despite these developments, the stability analysis and control of fixed-wing UAVs remain challenging because of the coupling between the different flight-dynamic variables and the sensitivity of the aircraft response to operating conditions. Recent studies have highlighted the importance of simultaneously evaluating longitudinal and lateral-directional dynamics when assessing the performance of flight-control strategies [11]. Robust and adaptive extensions of optimal control methods have also been investigated to address uncertainties, disturbances, and parameter variations [12, 13].

In this context, the objective of this study is to develop and analyze an LQR-based control strategy for improving the stability and dynamic performance of the Aerosonde UAV. A mathematical model of the UAV is established using longitudinal and lateral-directional flight dynamics and represented in state-space form. An LQR controller is then designed for the resulting models, and numerical simulations are performed to compare the uncontrolled and controlled responses. The analysis focuses on the principal longitudinal and lateral state variables, including velocity, vertical motion, pitch, roll, and yaw responses. The obtained results provide an assessment of the effectiveness of LQR control under the nominal operating conditions considered in this study and establish a basis for future investigations involving robust, adaptive, and intelligent control strategies

2. Materials and Methods

2.1. LQR Control

The Linear Quadratic Regulator (LQR) control method was implemented to stabilize the drone. The state-feedback gain matrix K was determined by solving the Riccati equation. The procedure used to compute the optimal control law is illustrated in Figure 1. The trade-off between system performance and control effort was achieved by selecting appropriate weighting matrices Q and R.

The LQR controller is a closed-loop control technique used to optimize the stability and performance of a dynamic system. It consists of minimizing a quadratic cost function defined as:

$$J = \int_0^{\infty} [x^T(t).Q.x(t) + u^T(t).R.u(t)]dt \quad (1)$$

1) x is the state vector,
2) u is the control input,
3) Q is the state weighting matrix,
4) R is the control weighting matrix

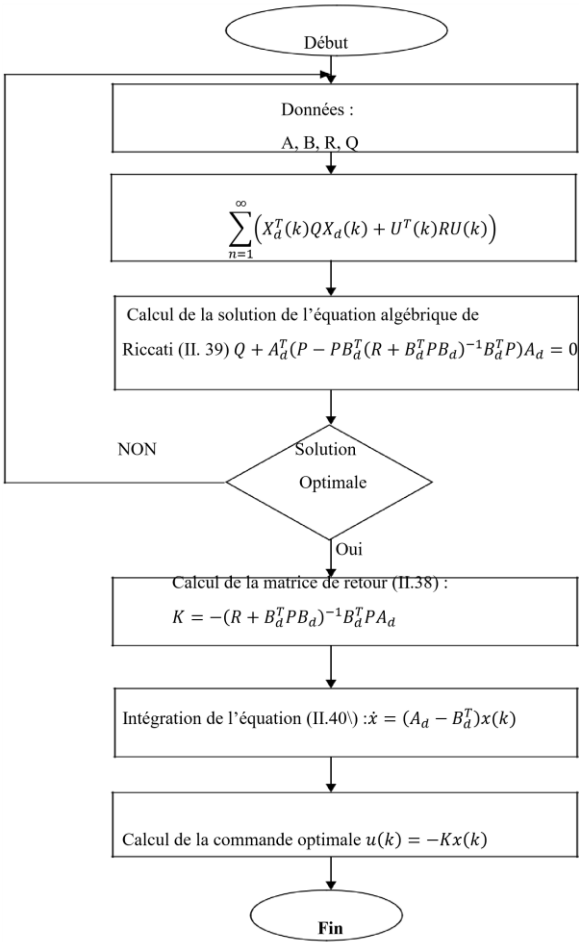

Figure 1. Flowchart for calculating the optimal quadratic control law.

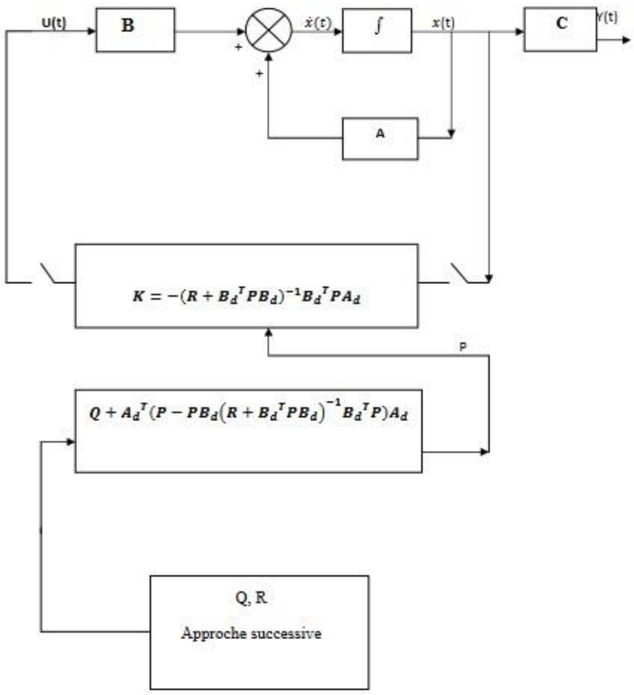

Figure 2. Closed-loop optimal control structure.

2.2. Longitudinal Model

The longitudinal motion equations of the drone are modeled by linearizing the flight equations around an equilibrium point.

$$\dot{x_{long}} = \begin{bmatrix} \dot{u} \\ \dot{w} \\ \dot{q} \\ \dot{\theta} \\ \dot{h} \\ \dot{\Omega} \end{bmatrix} = \begin{bmatrix} x_u & x_w & x_q - w_0 & g\cos\theta_0 & 0 & 0 \\ z_y & z_w & z_q + u_o & g\sin\theta_0 & 0 & 0 \\ m_u & m_w & m_q & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -1 & 0 & u_o & 0 & 0 \\ \Omega_u & \Omega_w & 0 & 0 & \Omega_h & \Omega_\Omega \end{bmatrix} \begin{bmatrix} u \\ w \\ q \\ \theta \\ h \\ \Omega \end{bmatrix} + \begin{bmatrix} x & 0 \\ z & 0 \\ m & 0 \\ 0 & 0 \\ 0 & 0 \\ 0 & \Omega \end{bmatrix} \begin{bmatrix} \delta_E \\ \delta_{th} \end{bmatrix} \quad (2)$$

u: Horizontal velocity
w: Vertical velocity
q: Pitch rate
θ: Pitch angle
h: Altitude.
Ω: Angular velocity
δ_E: Elevator control input
δ_{th}: Throttle control input

For an Aerosonde-type drone, the state equations are given as follows.

2.2.1. Longitudinal State Matrix (Alonga)

The state matrix A represents the internal dynamics of the UAV system. It describes the relationships between the state variables of the longitudinal motion.

$$A_{longa} = \begin{bmatrix} -0.2933 & 0.3877 & -0.5578 & -9.7843 & 0 & 0.0138 \\ -0.5509 & -5.3691 & 29.2782 & -0.1849 & 0 & 0 \\ 0.3382 & -5.6318 & -6.1948 & 0 & 0 & -0.0107 \\ 0 & 0 & 1.0000 & 0 & 0 & 0 \\ 0.0189 & -0.9998 & 0 & 30 & 0 & 0 \\ 41.5399 & 0.7850 & 0 & 0 & -0.63 & -3.85 \end{bmatrix} \quad (3)$$

2.2.2. Input Matrix

The input matrix B defines how the control inputs affect the system dynamics. It represents the influence of the elevator deflection and throttle input on the UAV motion.

$$B_{longa} = \begin{bmatrix} -0.3 & 0 \\ -3.7 & 0 \\ -50.2 & 0 \\ 0 & 0 \\ 0 & 0 \\ 0 & 02663.9 \end{bmatrix} \quad (4)$$

2.2.3. Gain Matrix

The gain matrix represents the feedback applied to the system in order to ensure stability and desired dynamic performance. It is obtained using the Linear Quadratic Regulator (LQR) method, which computes the optimal control gains based on the system model.

The gain matrix is used to determine the control input applied to the system in order to regulate the state variables.

The control law is defined as:

$$u(t) = Kx(t) \quad (5)$$

where:

K is the feedback gain matrix,

$x(t)$ is the state vector,

$u(t)$ is the control input.

The Alonga, Blonga, and Glonga matrices are essential for designing control laws that ensure the stability and performance of the drone.

$$\dot{x}(t) = Ax(t) + Bu(t)$$

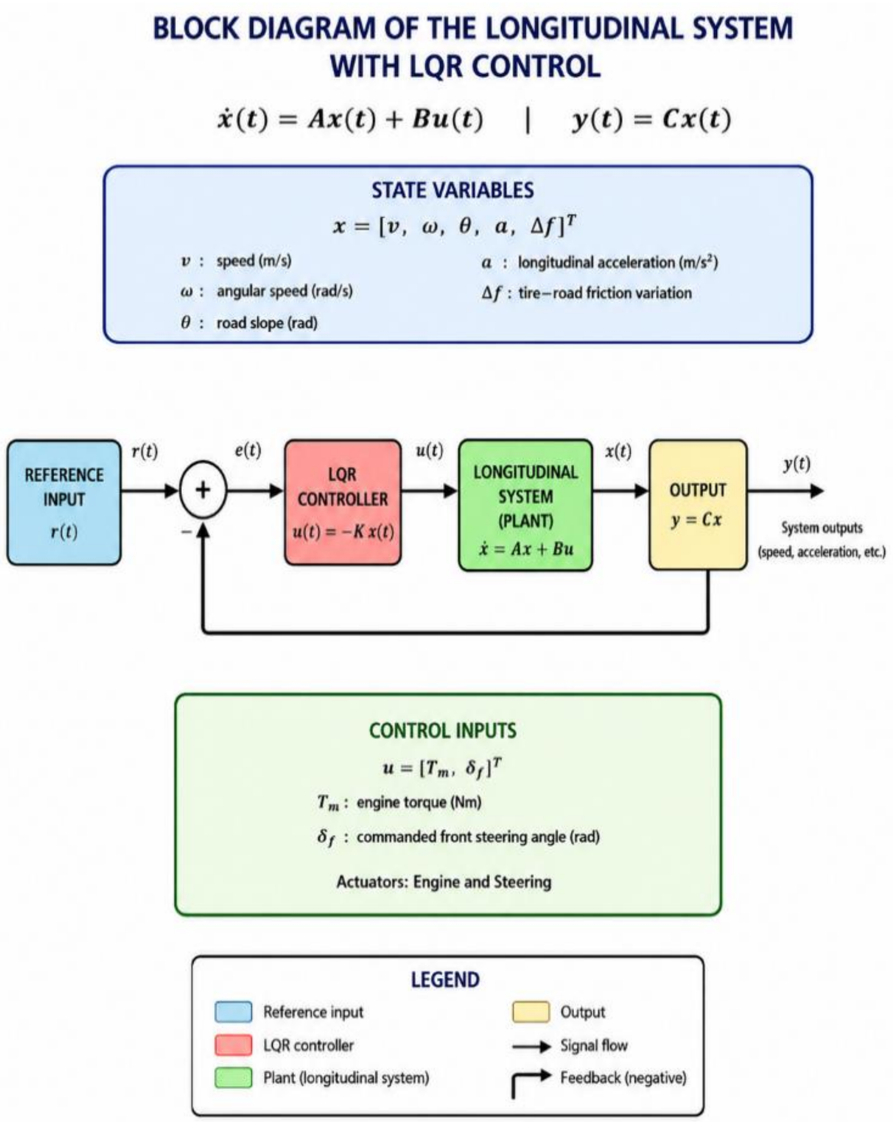

Figure 3. Block diagram of the longitudinal model with LQR control.

2.2.4. Longitudinal System Response

The response of the longitudinal system of the drone is analyzed with and without LQR control in order to evaluate the effectiveness of the proposed controller. The obtained results show the dynamic behavior of the system states under different operating conditions.

The longitudinal model with LQR control is illustrated in Figure 3.

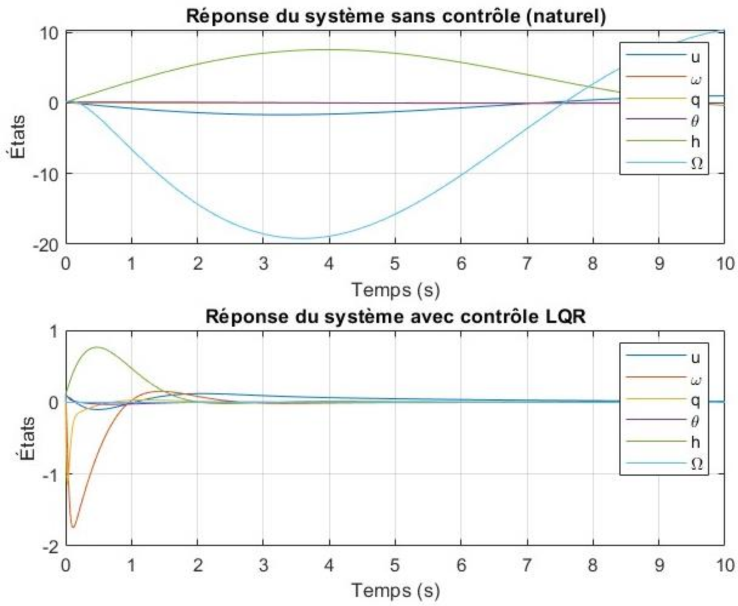

Figure 4*. Comparison of the longitudinal responses without control and with LQR control.*

The system response without control presents unstable behavior characterized by oscillations and slow convergence of the state variables. In contrast, the application of the LQR controller significantly improves the stability and dynamic performance of the drone.

The longitudinal response of the system without control and with LQR control is presented in Figure 4.

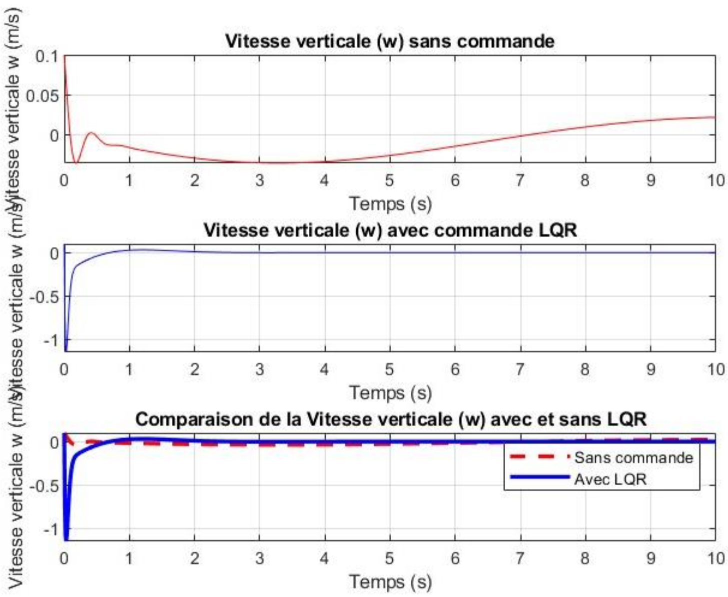

Figure 5*. Vertical velocity response (w) without control and with LQR control.*

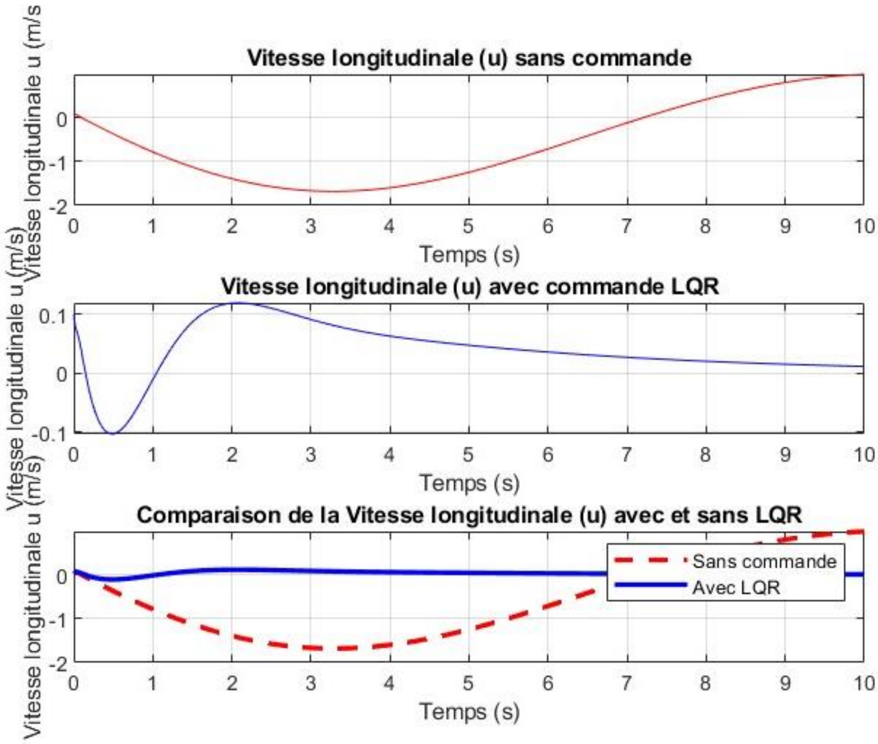

Figure 6. Longitudinal velocity response (u) without control and with LQR control.

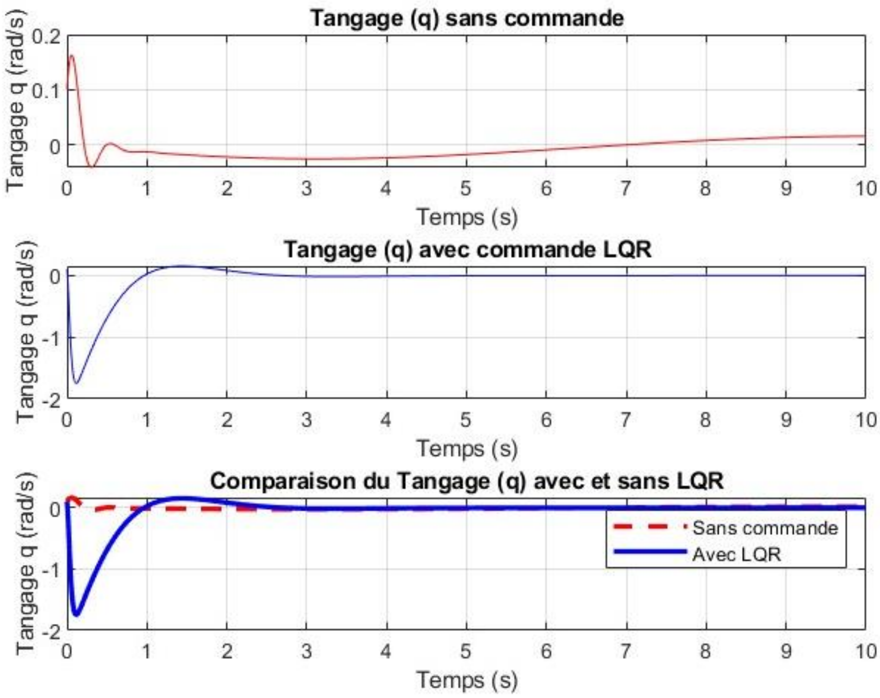

Figure 7. Pitch rate response (q) without control and with LQR control.

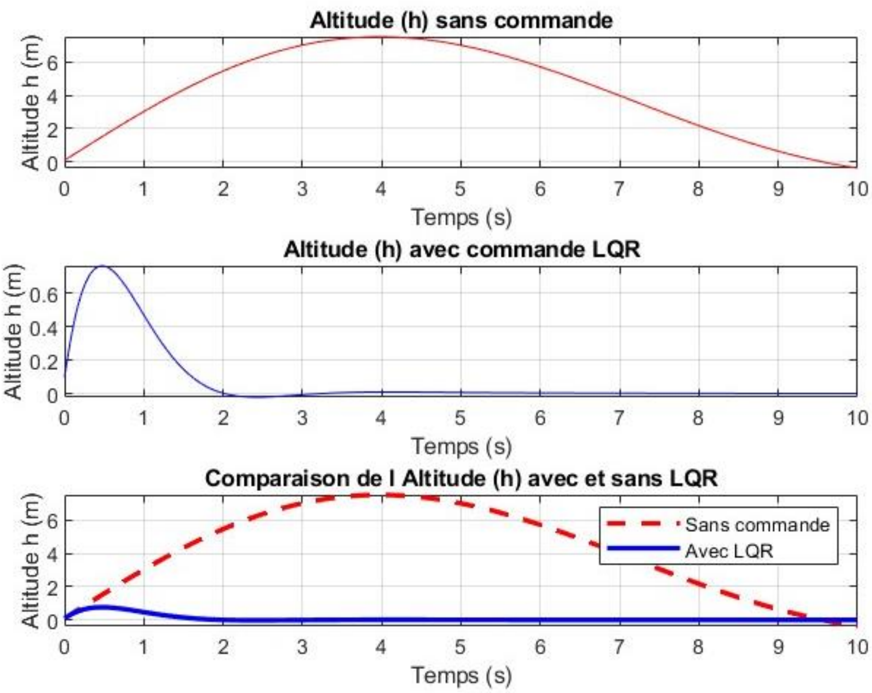

Figure 8. *Altitude response (h) without control and with LQR control.*

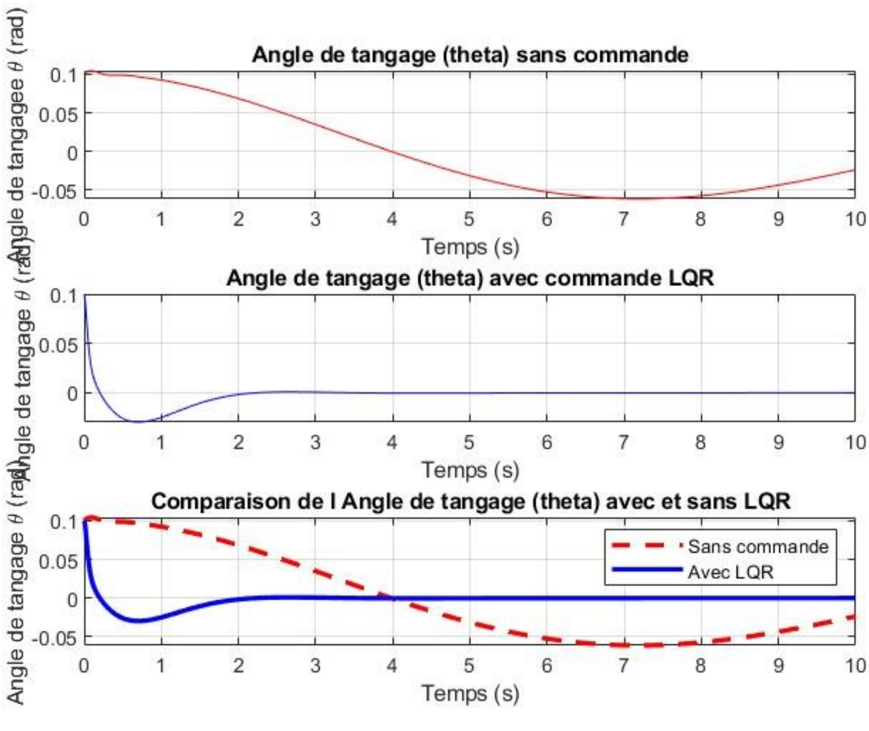

Figure 9. *Pitch angle response (θ) without control and with LQR control.*

The response of the longitudinal system of the UAV is analyzed with and without LQR control in order to evaluate the effectiveness of the proposed controller. The obtained results show the dynamic behavior of the system states under different operating conditions. The longitudinal model with LQR control is illustrated in Figure 3.

The comparison of the overall longitudinal responses without control and with LQR control is presented in Figure 4. The results show a significant improvement in the dynamic behavior of the UAV when the LQR controller is applied. The controlled responses exhibit reduced oscillations and improved convergence toward the equilibrium conditions

Figure 5 presents the vertical velocity response (w). Without control, the vertical velocity exhibits continuous oscillations and does not rapidly converge toward the equilibrium condition. In contrast, the LQR-controlled response converges more rapidly with reduced oscillations, demonstrating improved longitudinal stability.

Figure 6 illustrates the longitudinal velocity response (u). Without control, the longitudinal velocity exhibits significant fluctuations and does not reach a stable condition rapidly. With LQR control, the velocity converges more rapidly toward the equilibrium condition, indicating improved stabilization of the longitudinal dynamics.

The pitch rate response (q) is presented in Figure 7. The uncontrolled system exhibits persistent oscillations, whereas the LQR controller significantly reduces these oscillations and improves the damping of the pitch dynamics.

Figure 8 presents the altitude response (h). Without control, the altitude exhibits large variations, resulting in an unstable and unpredictable vertical motion. With LQR control, the altitude response becomes more stable and converges more rapidly toward the equilibrium condition, demonstrating improved altitude regulation.

Finally, the pitch angle response (θ) is shown in Figure 9. Without control, the pitch angle exhibits persistent oscillations and unstable behavior. After applying the LQR controller, the oscillations are effectively damped and the pitch angle converges toward the equilibrium position. These results demonstrate the effectiveness of the LQR controller in improving pitch attitude stability.

2.3. Lateral Model

The lateral motion of the UAV is modeled by linearizing the flight dynamics around an equilibrium operating condition. This model describes the lateral-directional behavior of the drone, including roll motion, yaw motion, and lateral velocity.

The lateral dynamic model can be represented in state-space form as:

$$\dot{x_{lat}} = \begin{bmatrix} \dot{v} \\ \dot{p} \\ \dot{r} \\ \dot{\psi} \\ \dot{\phi} \end{bmatrix} = \begin{bmatrix} y_v & y_p & y_r - u_0 & g & 0 \\ L_v & L_p & L_r & 0 & 0 \\ N_v & N_p & N_r & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix} \begin{bmatrix} v \\ p \\ r \\ \phi \\ \psi \end{bmatrix} + \begin{bmatrix} y & y \\ L & L \\ N & N \\ 0 & 0 \\ 0 & 0 \end{bmatrix} \quad (6)$$

where:

V: is the lateral velocity,
p: is the roll rate,
r: is the yaw rate,
ψ: is the roll angle,
ϕ: is the yaw angle,
δ_a: is the aileron control input,
δ_r: is the rudder control input.

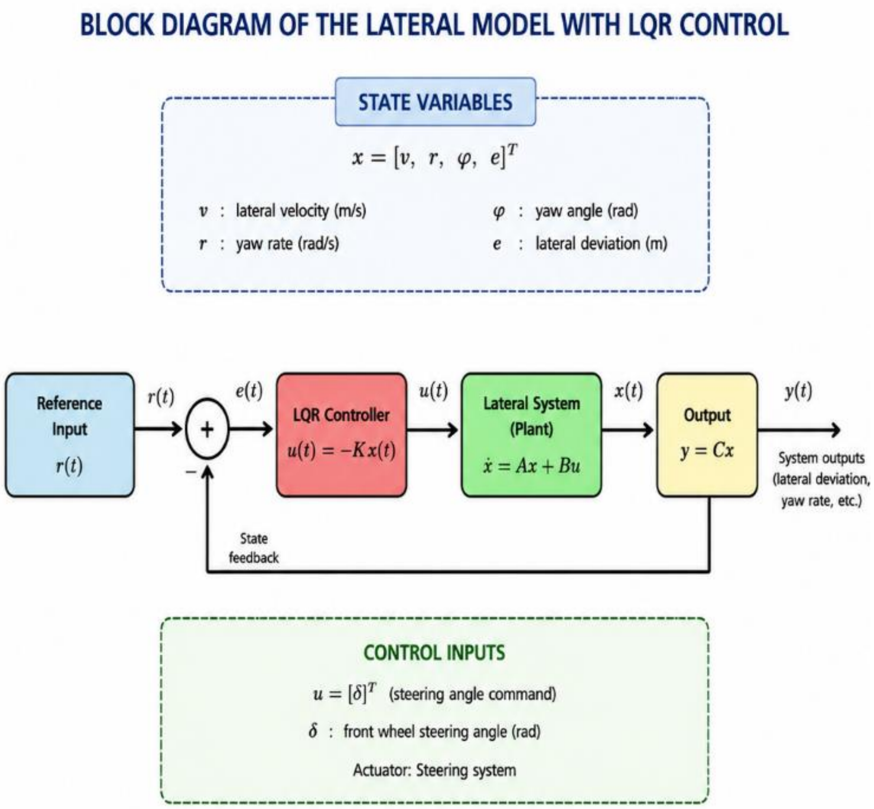

Figure 10. Block diagram of the lateral dynamic model of the Aerosonde UAV.

2.3.1. Lateral State Matrix (Alat)

The Alat matrix represents the internal lateral dynamics of the UAV system without external control inputs. It describes the relationships between the lateral state variables and their evolution over time.

The state matrix of the lateral model is expressed as follows:

$$A_{lat} = \begin{bmatrix} -0.0558 & -0.9968 & 0.0802 & 0.0415 \\ 0.5980 & -0.1150 & -0.0318 & 0 \\ -3.0500 & 0.3880 & -0.4650 & 0 \\ 0 & 0 & 1.0000 & 0 \end{bmatrix}$$

The matrix coefficients are obtained by linearizing the UAV lateral dynamics around the equilibrium flight condition.

2.3.2. Lateral Input Matrix (Blat)

The Blat matrix defines the influence of the control inputs on the lateral dynamics of the UAV system. It represents the effect of the aileron and rudder deflections on the lateral state variables.

The input matrix of the lateral model is expressed as follows:

$$B_{lat} = \begin{bmatrix} 0.0073 & 0.0000 \\ -0.4750 & 0.0077 \\ 0.1530 & 0.1430 \\ 0.0000 & 0.000 \end{bmatrix} \quad (7)$$

2.3.3. Gain Matrix

The gain matrix is used to apply state-feedback control in order to stabilize the lateral dynamics of the UAV system. The optimal gain matrix is obtained using the Linear Quadratic Regulator (LQR) method.

$$\dot{x}(t) = A_{lat}x_{lat}(t) + B_{lat}u_{lat}(t) \quad (8)$$

Where:

1) (K) is the feedback gain matrix,
2) (x(t)) is the state vector,
3) (u(t)) is the control input vector.

The gain matrix allows the reduction of oscillations and improves the stability and dynamic response of the UAV lateral system.

The Alat, Blat, and gain matrices are essential for designing the lateral control law and ensuring stable flight performance.

2.3.4. Lateral System Response

The response of the lateral UAV system is analyzed with and without LQR control in order to evaluate the effectiveness of the proposed controller. The obtained results illustrate the dynamic behavior of the lateral state variables under different operating conditions.

The lateral responses of the UAV system are presented in Figures 11-15. In each figure, the uncontrolled response is compared with the response obtained using the LQR controller.

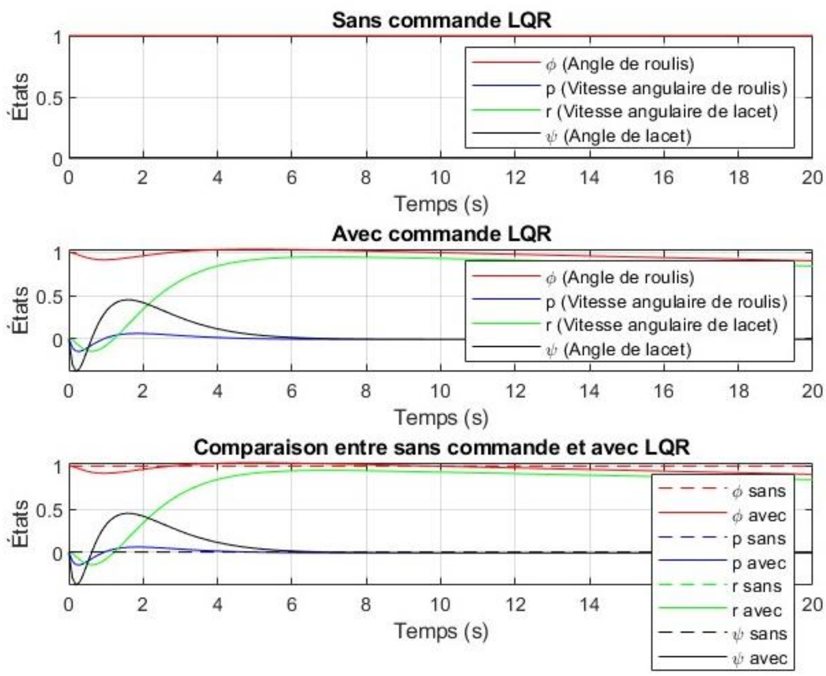

Figure 11. Lateral velocity response ((v)) without control and with LQR control.

Without control, the lateral velocity response exhibits oscillatory and unstable behavior. With the application of the LQR controller, the response rapidly converges toward the equilibrium state with reduced oscillations and improved stability.

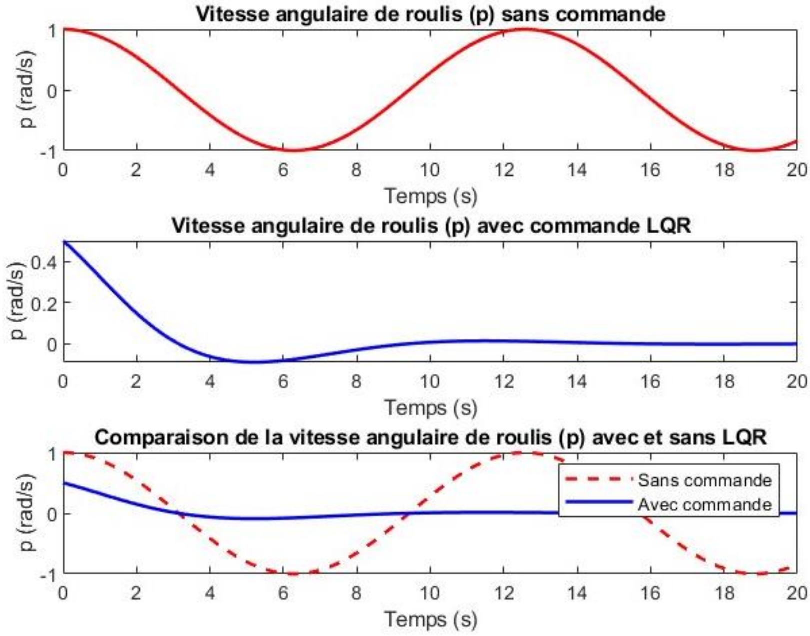

Figure 12. *Roll rate response ((p)) without control and with LQR control.*

The roll rate response demonstrates that the LQR controller effectively improves the damping characteristics of the system and reduces oscillatory behavior.

The yaw rate response becomes significantly more stable under LQR control. The controller reduces overshoot and improves the transient response of the UAV lateral dynamics.

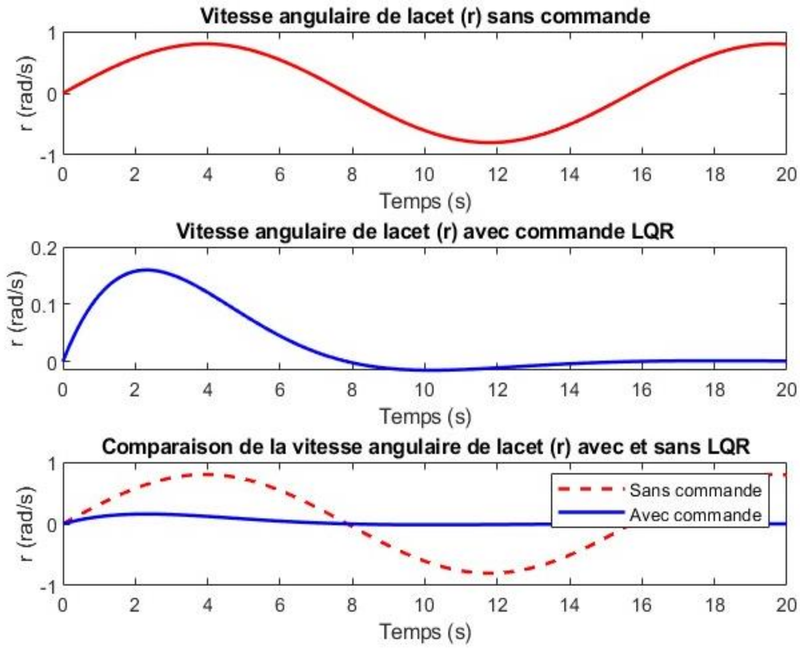

Figure 13. *Yaw rate response ((r)) without control and with LQR control.*

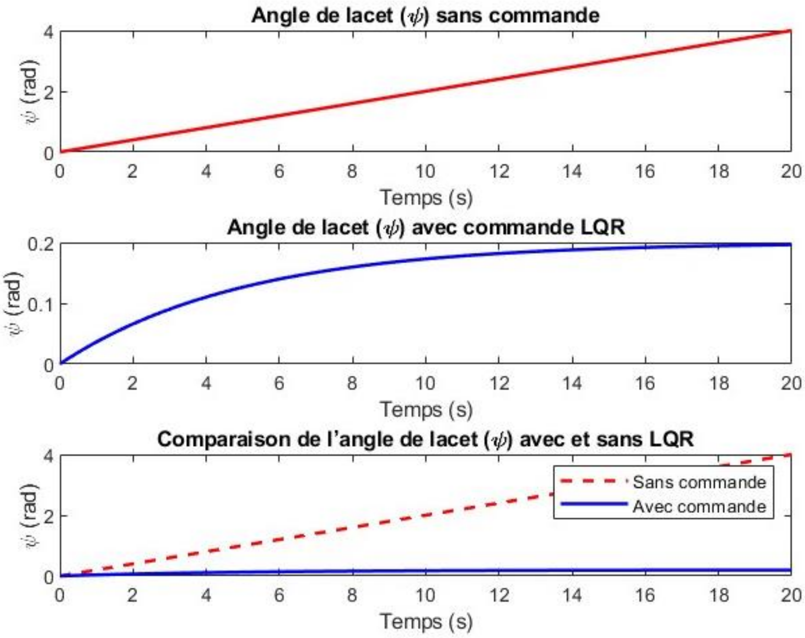

Figure 14. *Roll angle response ((\phi)) without control and with LQR control.*

The roll angle response indicates that the uncontrolled system experiences persistent oscillations, whereas the LQR-controlled system rapidly stabilizes and maintains better attitude control.

The results presented in Figure 15 confirm that the proposed LQR controller improves the overall stability and dynamic performance of the UAV lateral system. The controlled responses exhibit faster convergence and reduced oscillations compared with the uncontrolled case.

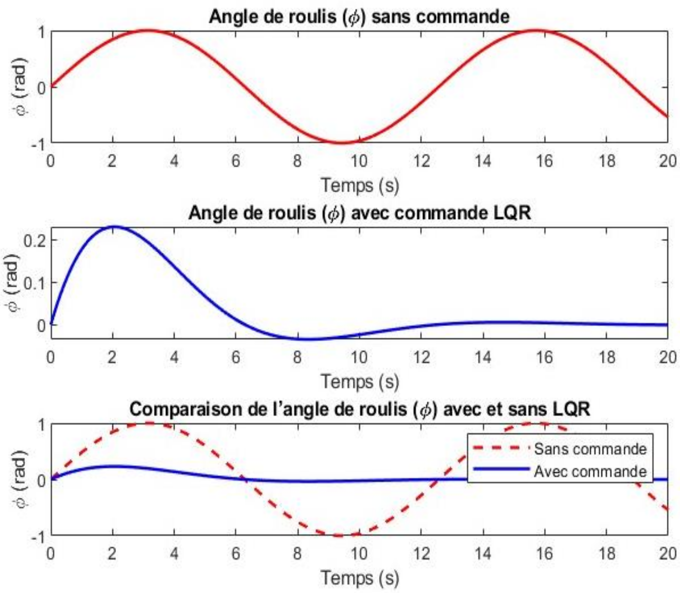

Figure 15. *Yaw angle response ((\psi)) without control and with LQR control.*

3. Discussion

The obtained simulation results demonstrate the effectiveness of the proposed LQR controller for stabilizing the longitudinal and lateral dynamics of the Aerosonde UAV. The comparison between the uncontrolled and controlled responses shows that the controller improves the dynamic behavior of the UAV by reducing oscillations and accelerating convergence toward the equilibrium conditions.

For the longitudinal dynamics, the LQR controller reduces oscillations and improves the transient response of the state variables. The longitudinal velocity, vertical velocity, pitch rate, altitude, and pitch angle responses exhibit more stable behavior under closed-loop control. These observations are consistent with recent research on fixed-wing UAVs, where LQR-based control has been investigated for both longitudinal and lateral flight dynamics [9, 11].

Similarly, the lateral model demonstrates improved stability and dynamic response when the LQR controller is applied. The lateral velocity, roll rate, yaw rate, roll angle, and yaw angle responses converge more rapidly toward their equilibrium conditions, with reduced oscillatory behavior. Recent studies have emphasized the importance of evaluating both longitudinal and lateral dynamics when assessing UAV flight-control strategies [11].

The obtained results also show that the LQR controller provides improved transient behavior under the nominal conditions considered in this study. However, the present simulations do not explicitly evaluate external disturbances, measurement noise, or significant model uncertainties. Recent research indicates that LQR-based control can be further combined with adaptive or hybrid control strategies to improve disturbance rejection and robustness under changing operating conditions [10, 12-15].

Therefore, the present results should be interpreted as a baseline assessment of LQR-based stabilization for the Aerosonde UAV. The proposed approach provides effective state-feedback stabilization under the considered operating conditions, while future investigations should evaluate its performance under wind disturbances, model uncertainties, measurement noise, and parameter variations. Such investigations could also consider hybrid or robust control strategies to further improve the reliability of the UAV control system [10, 12-15].

4. Conclusions

This study presented the design and implementation of a Linear Quadratic Regulator (LQR) controller for the stabilization of an Aerosonde-type UAV. The longitudinal and lateral dynamic models were developed using state-space representation in order to analyze the behavior of the drone under different flight conditions.

The simulation results demonstrated that the proposed LQR controller significantly improves the stability and dynamic performance of the UAV. In both longitudinal and lateral motions, the controller effectively reduces oscillations, minimizes overshoot, and decreases the settling time of the system responses.

The controlled system exhibited faster convergence toward equilibrium conditions compared with the uncontrolled system. The results confirmed that the LQR approach provides efficient stabilization and enhances the robustness of the UAV flight dynamics.

Therefore, the proposed control strategy represents an effective solution for improving UAV flight stability and control performance. Future work may focus on the implementation of adaptive, robust, or intelligent control techniques in order to further improve system performance under external disturbances and uncertain operating conditions.

Abbreviations

LQR	Linear Quadratic Regulator
UAV	Unmanned Aerial Vehicle
PID	Proportional Integral Derivative
AUV	Autonomous Underwater Vehicle
u	Longitudinal Velocity
(w)	Vertical Velocity
(q)	Pitch Rate
(h)	Altitude
(ψ)	Pitch Angle
(v)	Lateral Velocity
(p)	Roll Rate
(r)	Yaw Rate
(ϕ)	Roll Angle
$(\backslash psi)$	Yaw Angle
(δ_E)	Elevator Control Input
(δ_{th})	Throttle Control Input
(δ_a)	Aileron Control Input
(δ_r)	Rudder Control Input

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Author Contributions

Njaratahiry Anicet Ranjalahy: Conceptualization, Formal Analysis, Investigation, Methodology, Software, Writing – original draft

Radoniaina Rasoamanana: Resources, Supervision, Validation, Writing – review & editing

Andry Auguste Randriamitantsoa: Data curation, Project administration, Validation, Visualization, Writing – review & editing

Data Availability Statement

The data supporting the outcome of this research work has been reported in this manuscript.

Conflicts of Interest

The authors declare no conflicts of interest.

References

[1] Beard, R. W., McLain, T. W. Small Unmanned Aircraft: Theory and Practice. Princeton, NJ: Princeton University Press; 2012. https://doi.org/10.1515/9781400840601

[2] Stevens, B. L., Lewis, F. L., Johnson, E. N. Aircraft Control and Simulation: Dynamics, Controls Design, and Autonomous Systems. 3rd Edition. Hoboken, NJ: John Wiley & Sons; 2015. https://doi.org/10.1002/9781119174882

[3] Anderson, B. D. O., Moore, J. B. Optimal Control: Linear Quadratic Methods. Englewood Cliffs, NJ: Prentice Hall; 1990.

[4] Nelson, R. C. Flight Stability and Automatic Control. 2nd Edition. New York, NY: McGraw-Hill; 1998.

[5] Cook, M. V. Flight Dynamics Principles. 3rd Edition. Oxford, UK: Butterworth-Heinemann; 2013. https://doi.org/10.1016/C2010-0-65889-5

[6] Etkin, B., Reid, L. D. Dynamics of Flight: Stability and Control. 3rd Edition. New York, NY: John Wiley & Sons; 1996.

[7] Franklin, G. F., Powell, J. D., Emami-Naeini, A. Feedback Control of Dynamic Systems. 7th Edition. Boston, MA: Pearson; 2015.

[8] Skogestad, S., Postlethwaite, I. Multivariable Feedback Control: Analysis and Design. 2nd Edition. Chichester, UK: John Wiley & Sons; 2005.

[9] Admas, Y. A., Mitiku, H. M., Salau, A. O., Omeje, C. O., & Braide, S. L. (2024). Control of a fixed wing unmanned aerial vehicle using a higher-order sliding mode controller and nonlinear PID controller. Scientific Reports, 14, 23139. https://doi.org/10.1038/s41598-024-73901-y

[10] Wang, B., Yan, Y., Xiong, X., Han, Q., & Li, Z. (2024). Attitude control of small fixed-wing UAV based on sliding mode and linear active disturbance rejection control. Drones, 8(7), 318. https://doi.org/10.3390/drones8070318

[11] Ulus, Ş., & Eski, İ. (2026). A comprehensive assessment of control strategies for longitudinal and lateral flight of fixed-wing UAVs. The Aeronautical Journal, 130(1349), 2207–2237. https://doi.org/10.1017/aer.2026.10152

[12] Salazar, E., Lozano, R., & Salazar, S. (2025). Nonlinear feedback linearization control and region of attraction analysis for a fixed-wing UAV. Drones, 9(9), 606. https://doi.org/10.3390/drones9090606

[13] Metekia, E. W., Asfaw, W. A., Abdissa, C. M., & Lemma, L. N. (2025). Control of a fixed wing unmanned aerial vehicle using a robust fractional order controller. Scientific Reports, 15, 19954. https://doi.org/10.1038/s41598-025-03552-0

[14] Wu, E., Wang, P., & Guo, Z. (2025). Adaptive robust optimal control for UAV taxiing systems with uncertainties. *Drones, 9*(10), 668. https://doi.org/10.3390/drones9100668

[15] Zhou, Z., Liu, F., & Chen, M. (2026). Dynamic output feedback L_2–L_∞ resilient control of uncertain fixed-wing UAV under composite disturbances. *Journal of Control and Decision, 13*(1), 148–158. https://doi.org/10.1080/23307706.2025.2576123

Biography

Njaratahiry Anicet Ranjalahy is a Ph. D. candidate at the Doctoral School of Engineering and Innovation Sciences and Technologies (ED-STII), University of Antananarivo, Madagascar. He is currently an Engineer and University Lecturer. He holds a Research Master's degree in Advanced Systems Engineering with specialization in Mechatronics from the Higher Polytechnic School of Antananarivo. He also earned a Master's degree and a Bachelor's degree in Telecommunications with specialization in Network and Transmission Engineering from CNTEMAD (Centre National de Télé-Enseignement de Madagascar). In addition, he obtained a Bachelor's degree in Physics and Applications from the Faculty of Sciences, University of Antananarivo. His current research focuses on UAV Control Systems, optimal control techniques, flight dynamics, mechatronic systems, embedded systems, robotics, and intelligent control applications.

Research Field

Njaratahiry Anicet Ranjalahy: UAV Control Systems, Automatic Control, Flight Dynamics, Optimal Control, Mechatronic Systems, Embedded Systems, Robotics, Intelligent Control, Aerospace Systems, System Modeling