Adaptive Backstepping Sliding Mode Fault-Tolerant Control of Quadrotor UAV in the presence of external disturbances, uncertainties, and Simultaneous Actuator and Sensor faults

Dear Reviewer,

We would like to express our sincere gratitude for your valuable and insightful remarks regarding our manuscript. Your detailed suggestions have been instrumental in enhancing the quality and clarity of our work, and we deeply appreciate the time and effort you dedicated to reviewing our paper.

We have carefully addressed each of your comments and hope we have taken full consideration of all your suggestions to meet your expectations. Below, we provide a table summarizing your remarks and the corresponding actions taken by the authors.

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| --- | --- | --- |
| No. | Reviewer Remark | Response and Action Taken |
| 01 | While the simulations are strong, **no hardware-in-the-loop (HIL)** or real-world experiments are provided. This limits the evaluation under real-world sensor noise, latency, and fault dynamics. | We acknowledge this limitation and have addressed it in the revised conclusion by including future research directions for hardware-in-the-loop testing and experimental validation to evaluate performance under realistic sensor noise, latency, and fault dynamics. |
| 02 | The observer and controller, especially with LMI solving and multiple sliding surfaces, may impose a **computational burden** on embedded systems. Discussion on runtime or computational cost is lacking. | The LMI optimization for observer design is performed offline during the design phase, not during real-time operation, which mitigates the computational burden on embedded systems. The online computational load consists primarily of the observer and controller implementation, which involves standard matrix operations suitable for embedded flight controllers. We have addressed this concern in the revised conclusion by emphasizing the importance of real-world implementation to verify hardware constraints and computational feasibility on actual embedded systems. |

We trust that the revised manuscript now aligns with the journal's standards and hope it meets with your approval. Should there be any further points for improvement, we would be happy to address them.

Kind regards,