Design of energy management strategy for solar-powered UAV

Response to Reviewer 1 Comments

Dear Reviewer,

Thank you for taking the time to review our manuscript titled “[Design of energy management strategy for solar-powered UAV].” We appreciate your valuable feedback and suggestions for improvement. In response to your comments, we have made the following revisions:

Comments 1: Mention the reference for solar-powered UAV parameters.

1. We have added the reference to the parameters of the solar-powered UAV. In the revised version of the manuscript, the reference is [16].

Comments 2: How the weight has decided as 75 kg?

2. According to Table 1 in the revised version of reference [16], the weight of the UAV has been determined.

Comments 3: Mention reference for all mathematical expression if adopted from any reference.

3. We have added citations to all the formulas adopted from the references. This includes [17], [19], [20], [21], [22], and [26].

Comments 4: Mention the software/tool used for the analysis.

4. We have added the software used in this study, which is MATLAB, to the manuscript. In the "Optimize results and analysis" section, we have included the following statement: "The optimization outcomes were calculated using

MATLAB..."

Comments 5: Literature review must contain latest papers.

5. In the literature review section, we have included an analysis of the latest publication [2]. This paper, published in an open-access journal in 2023, has a shorter review period, making it more up-to-date compared to other journal articles in 2023.

Comments 6: Authors have compared the results with reference [20]. Authors should specify that whether the objective function used by the [20] is similar to the considered in the manuscript. If objective function is not same then author should justify the selection for comparison.

6. In the original manuscript, the objective function of [20] consists of three components: acquired energy, charged energy, and consumed energy. Optimizing the input energy during the climbing phase would lead to an increase in consumed energy during this process. The additional energy consumption outweighs the additional energy acquisition, resulting in a detrimental effect. Moreover, the charged energy is dependent on the energy acquired and consumed, and cannot be optimized through active control. Therefore, optimizing the consumed energy as the objective function in the climb phase yields better results. In the glide phase, the first two objective functions are meaningless due to the absence of solar input. This aligns our objective function with that of the reference.

   We have added an explanation of this aspect in lines 325 to 339 and have included Figure 11 to support this explanation.

Comments 7: PSO is used for the optimization. Author should justify the selection of PSO over the other existing meta-heuristic methods.

7. In the midst of numerous metaheuristic algorithms, particle swarm

optimization (PSO) stands out due to its simplicity, strong global search capability, and easy parameter tuning. The particles in PSO exhibit strong parallelism, enabling the simultaneous exploration of multiple solution spaces, thus accelerating the convergence speed of the algorithm. These unique advantages of PSO make it an important choice in solving the long-endurance problem.

We have added an explanation of this aspect in the third section, "Problem Conversion and Solution," from line 201 to 207.

Comments 8: How PSO is used in the proposed problem solution? Should be explained in detail either with flowchart or steps.

8. We have used a flowchart (Figure 5) to illustrate the steps of the PSO algorithm in solving this optimization problem. The flowchart combines the optimization problems of climbing and gliding, and clearly shows the overall framework of the algorithm and the execution sequence of each step, ensuring that readers can accurately understand our method.

Comments 8: Avoid reference citation in conclusion.

9. We have removed the reference [21] from the conclusion section of the original version of the manuscript. In the new version of the manuscript, there are no references in the conclusion section.

English Language：

Additionally, we have polished the English expression, standardized the wording of certain phrases, and rectified the capitalization errors in the titles, making the entire manuscript more aligned with the requirements of an academic paper.

We believe that these revisions have significantly strengthened our manuscript and addressed the concerns raised in your review. We would like to express our

sincere gratitude for your insightful comments, which have greatly contributed to the enhancement of our research.

Thank you once again for your time and effort in reviewing our manuscript.

King regards,
Yuanjin Gao.