Review of: "Numerical Simulation and Computational Fluid Dynamics Analysis of Two-Dimensional Lid-Driven Cavity Flow Within the Weapon Bay of an Autonomous Fighter Drone"

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Potential competing interests: No potential competing interests to declare.

The manuscript discusses the utility of computational fluid dynamics (CFD) in addressing intricate aerodynamic challenges within the weapon bay of autonomous fighter drones. This concept holds significant value for aerodynamic designers. Nonetheless, the manuscript suffers from narrative shortcomings that need to be rectified for publication. Enhancing the overall clarity of the manuscript is imperative prior to its acceptance for publication. The observed shortcomings are mentioned below:

Abstract:

The abstract clearly outlines the primary objective, which is to optimize the design of autonomous fighter drones for military operations by analyzing the airflow within their weapon bays. However, it does not explicitly state the research gap or problem that this study aims to address. Including a sentence that clearly articulates the gap or problem in the current understanding of autonomous fighter drone design would help orient the readers.

- “To address this challenging problem, we employ CFD analysis and a multigrid approach to solve the Navier-Stokes equations for the aerodynamic problem”- which problem are the authors talking about? There is a repetition of “challenging problem” and “aerodynamic problem” in the same statement.
- Reynolds number up to 10000 or 1000?
- The acronym UAV has been used in the last sentence without defining it in the abstract.

Introduction:

- Using “computational fluid dynamics (CFD)” every time is not required. Only “CFD” can be used once it is defined.
- The citation at the end of the sentence “In this study, we present a numerical simulation and computational fluid dynamics (CFD) analysis of three-dimensional lid-driven cavity flow within the weapon bay of an autonomous fighter drone [12]” seems irrelevant.
- The sentence “In conclusion, we believe that our study provides valuable insights into the use of CFD analysis and the multigrid approach to address the challenges faced in the development of autonomous systems for military applications” should be placed in the conclusion section. The authors need not conclude anything in the introduction.
- Complete the sentence “The momentum conservation equations in the x,y and z directions [18],”

- What is the basis for limiting Re to 1000?

Numerical methodology:

- “Convergence monitors were built to track the convergence of the numerical solution.”- specifically mention which convergence monitors were built
- The sentence “The importation of the grid, which served as the computing environment for the flow solver issue, is shown in Figure 2.”, Fig.2 and its caption do not show relevance to each other. Provide more clarity.
- “ The governing equations were discretized using a suitable discretization scheme, as shown in Figure 3, ensuring accurate and effective numerical calculations.“ The discretization scheme is not evident in Fig. 3
- Fig. 4 and the caption has been repeated.
- “The research report is particularly interested in the fluid movement inside the hollow.”- Hollow what?
- “The picture depicts the precise boundary conditions that were enforced throughout the research investigation”- which picture?
- Section 3.2: Kindly eliminate the general technical requirements and provide more specific details on the boundary conditions used and the basis for using them
- Equation (12) in the numbering has been used twice.
- There is inconsistency in using the notation Eq. () in the text.
- The variables are used multiple times in the text and defined somewhere at a later stage. All the variables should be properly defined at the first instance that they are used.

Results:

- The validation of the results obtained in this study with the published results should be graphically represented for the ease of the readers
- Figures are blurry. Better images can be used
- The results seem to be briefly described. A more comprehensive explanation can improve the quality of the paper, as results and discussion is a very important section of the paper.

Conclusion:

- The general text “UAVs have a wide variety …….proactively resolving these problems.” Should not be a part of the conclusion section.

General:

- The writing style of the entire paper should be thoroughly checked for the ease of the readers. More clarity should be provided.
- The variables in the text should be denoted with italics throughout the paper. For example, check section 3.2.