

How to Write a Scientific Paper

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How to write a Scientific Paper

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General Structure

- Good work is incomplete without good documentation
- Writing style is as important as the content of the paper
- A scientific paper is primarily composed of:
 - Title
 - Abstract
 - Keywords
 - Introduction
 - Theory and Methods
 - Results
 - Discussion

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Title

- A good title should have the following characteristics:
 - Precise: describing a specific problem
 - Brief: no details of how the work is carried out is needed
 - Unambiguous
 - Catchy
 - Descriptive phrase not a question
 - Avoid extreme words like “First” and “Novel” unless you are sure.
- Good example
 - “The Need for Higher-Order Averaging in the Stability Analysis of Hovering, Flapping-Wing Flight”
 - This title is precise, brief and stirs up curiosity to know why higher order averaging is needed in such a problem

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- **Abstract**

- It gives the reader the big picture of the work presented
- Specify Why, how the work is done
- Mention briefly the results and conclusion of the work
- It is preferable no to exceed 200 words
- Good example:
 - Flapping-Wing Micro-Air-Vehicles are complex systems whose concept is inspired from biological flyers in nature. The aim of this thesis is to investigate the stability of the hovering state in FWMAVs and insects. Flight Dynamics of FWMAVs and insects constitutes a nonlinear time periodic system with unconventional contributors to the aerodynamics of flight. In this work, an aerodynamic-body-dynamic model that captures the dominant physical aspects in the flow field is derived. Full simulations are carried out showing the inherent instability in the system dynamics. The periodic equilibrium of the nonlinear time periodic system is captured using the optimized shooting method. Furthermore, the Floquet theorem is used to assess the stability of the captured periodic orbit corresponding to hovering equilibrium. The results show that the system is indeed unstable.

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Keywords

- Keywords are essential to help a journal editor select reviewers
- Important for search engines and for others to find
- Keywords have to be relevant to the work carried out
- Good example:
 - For the work mentioned in the previous abstract “Nonlinear Time Periodic Systems – periodic Orbits – Flapping Flight – Floquet Theory”
 - This example is good because the author used keywords that are relevant to the topic

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Introduction

- Start with a compelling story
- Engage the reader
- Be brief and focused
- Mention the essence of the work and the methods used
- State the organization of the paper and the findings

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Literature Review

- Surveys books and articles related to the field
- Previous work highlighting most recent advances
- Important to reveal the gaps in the literature
- Locate the current work relative to the previous work
- Types of Literature Review
 - **Argumentative** (examines literature to support or refute an argument)
 - **Integrative**
 - **Historical** (examines literature done in a specific period of time)
 - **Methodological** (focuses on how some specific results were found)
 - **Systematic** (overview of existing evidence pertinent to a clearly formulated research question)
 - **Theoretical** (examine the corpus of theory that has accumulated in regard to a concept or theory)

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Theory and Methods

- Theories that were exploited in the paper should be explained
- Proposed approaches should be elaborated
- Equations related to the development of an approach should be explained

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Results

- Results should be presented in all possible ways based upon the methodology used
- Figures and tables should have self-explanatory captions
- The importance of the results should be addressed
- Avoid presenting data that is not critical to the research question

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Conclusion and Discussion

1. Interpretation of the findings in the results section
2. Critical dissection of the findings and comparing them to previous work
3. Implications of the current work on the same field and on other fields
4. Use the same sequence used in the results section

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References

- Allows reader to locate material used by the author
- Use a specific citation style (IEEE, AIAA, etc)
- Use of Latex bibliography is very helpful
- Don't cite references that you have not read

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Language Use

- Use of passive voice is a must
- Avoid contractions
- Explain Acronyms
- Use punctuation rules
- Use easy language