

FSM Workshop #2:  
Written Communication  
5 October 2022

By Jaylon McGhee

# Outline

Journal Selection

Structure of a Research Article

- Introduction
- Methods
- Results & Discussion
- Conclusion

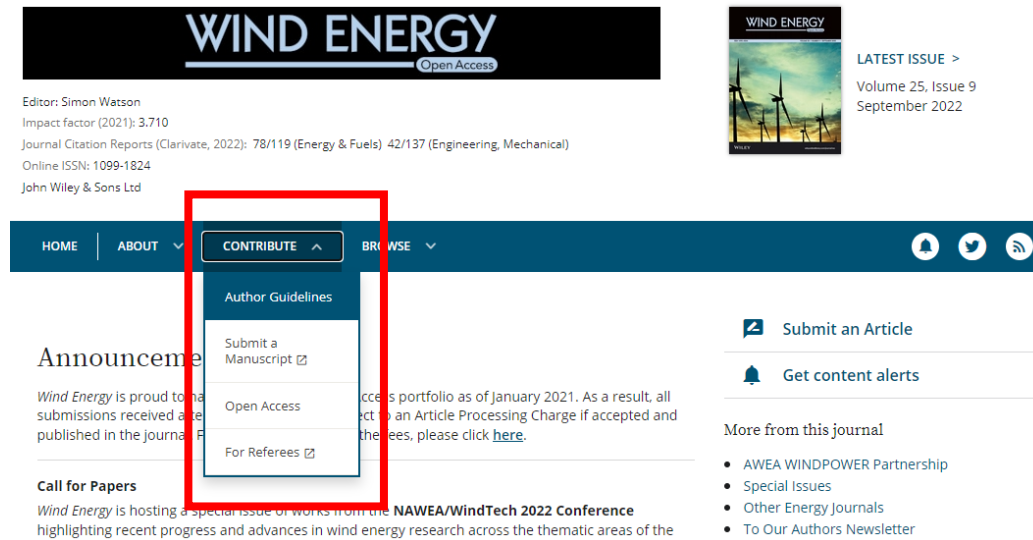
Revisions

- Grammatical
- Coherence
- Review



# Prior to Writing: Journal Selection

- Research Focus: How does this work advance knowledge and understanding in a certain scientific field?
  - Does the primary research focus reflect of the scope of the journal that you intend to submit to?
- Where is the best place to publish the results?
  - Format
  - Length
  - Communication Style



# Structure of a Research Article

Component	Description
Title	10-20 Words that best describe your work
Abstract	Concise summary of the entire research article
Introduction	Explanation of why you did the work, understanding of prior work, and an outline of the significance of your work
Methods	Explanation of how you performed the study and what material, tools, and techniques you used.
Results (& Discussion)	Presentation of the results and discussion of the significance of the results
(Discussion &) Conclusion	Take home messages of the research article
References	All the works cited in your paper
Author's & Acknowledgements	Author list and acknowledgement of funding sources

# Title & Abstract

## Purpose

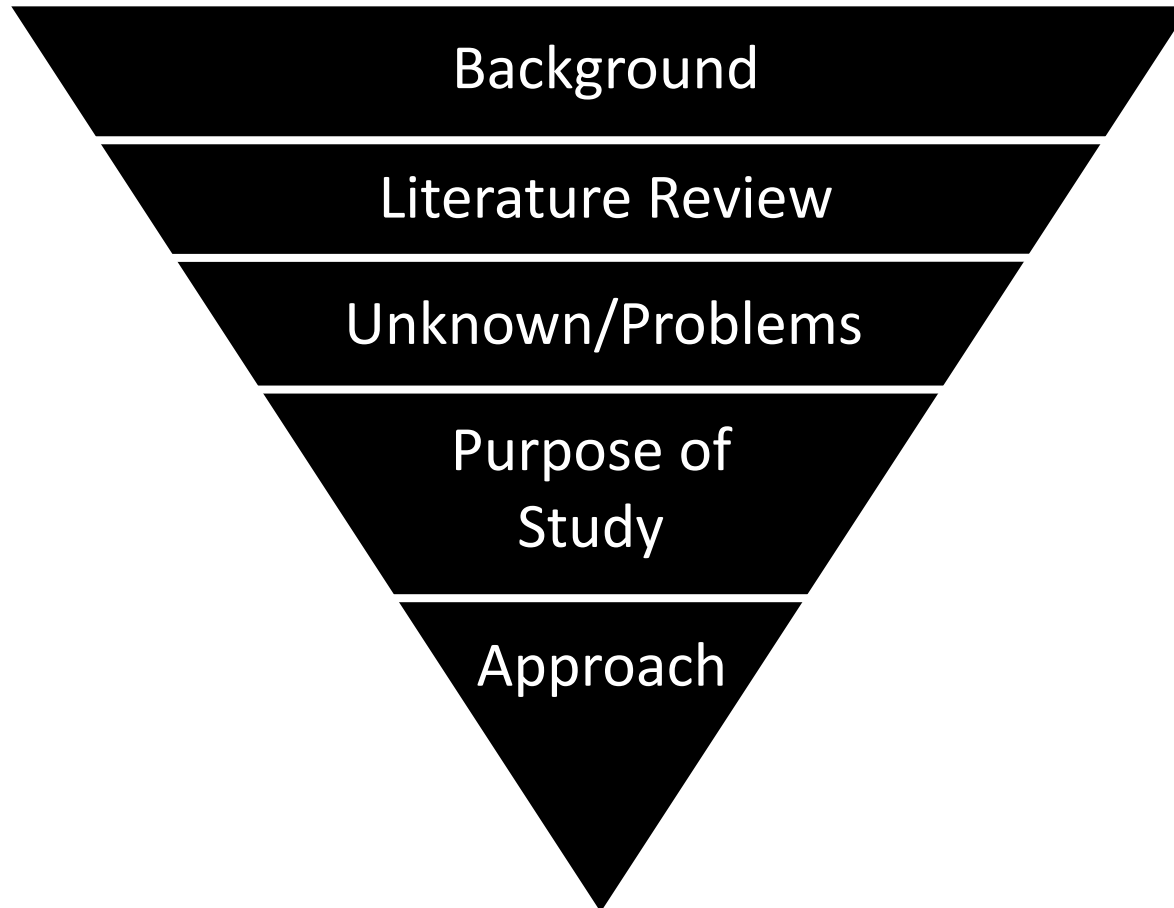
- Gain the reader's attention
  - Title – Concise description of the work
  - Abstract – concise summary of the entire research article
    - Question/Purpose
    - Description of how results were obtained
    - Important Results
    - Significance/Conclusions

## Common Problems

- Brevity
  - Titles – between 10-20 words that best describe the research article
  - Abstract – between 150-250 words that summarize your entire research article

# Introduction

## Components



## Common Problems

- Excessive Length
- Narrow Context/Background
- Obscure Key Terms
  - Terms are often interchangeable when writing
    - For example:
      - Convective Derivative (Fluid Mechanics)
      - Convective (Heat Transfer)

# Methods

## Components

- Facility/Materials/Tools
- Software
- Analysis Techniques

## Common Problems

- Insufficient Details
- Unjustifiably switching between active voice and passive voice
- Unjustifiably switching between past tense and present tense

# Results (& Discussion)

## Components

- Figures & Tables
  - Captions
- Discussion
  - Description of the data
  - Result: Interpretation of the data
  - Contribution of the result to the overall theme/story of your research article

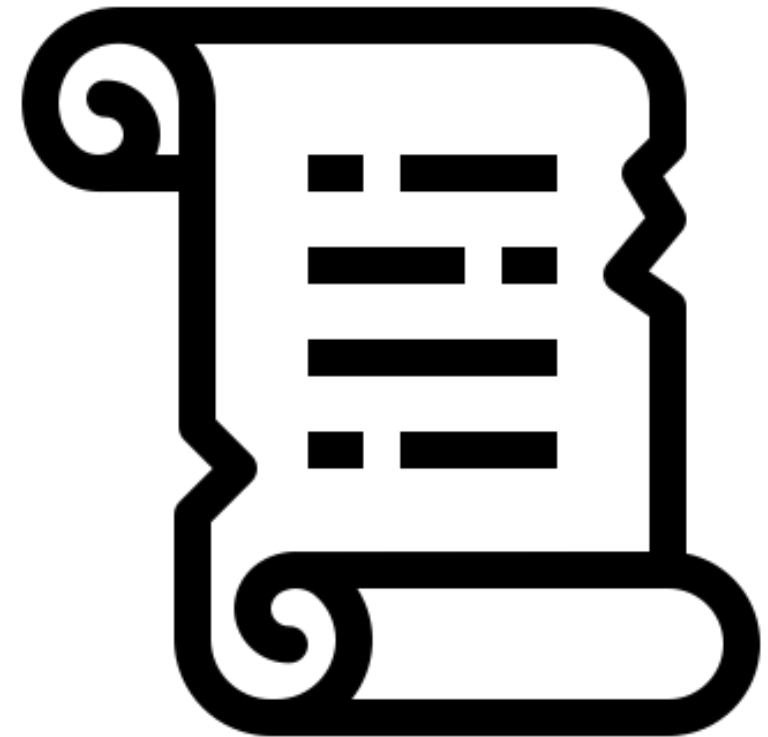
## Common Problems

- Complex Figures
- Irrelevant Peripheral (or repetitive) information is provided
- Inclusion of conclusions/speculations beyond the interpretation of the results
- Unspecific expressions
  - The magnitude of the streamwise velocity increased significantly.
  - The streamwise velocity doubled in magnitude.



# (Discussion &) Conclusion

- Purpose:
  - Provide the reader with the take home messages of your research article
- Components:
  - Repeat what was done in your study
  - Summarize the Key Findings
  - Takeaway messages



# Revisions & Resources

## Check for Plagiarism

- Turnitin Plagiarism Protection
- Grammarly
- Skandy



## Sentence Level Revisions

- Grammarly
- Read paper out loud to yourself



## Final Review

- CU Boulder Writing Center
- Send out individual sections/subsections to group members for technical review
- Final Review with co-authors
- Submission to Journal

# Additional Writing References

- Campus Resources:
  - Topics in Scientific Writing (PHYS 7820)
    - Offered every Spring
  - CU Boulder Writing Center
- Online:
  - WILEY – How to Get Published in Academic Journals
- Textbooks:
  - Scientific Writing and Communication: Papers, Proposals, and Presentations
    - By Angelika H. Hoffman

The Second FSM Seminar Workshop of the  
2022-23 Academic Year, 5 October 2022

# **The Process of Creating High- Quality Papers for Publication**

**James Brasseur and Jaylon McGhee**

Aerospace Engineering Sciences,  
University of Colorado Boulder

Over-riding theme: **COMMUNICATION & TEACHING**

Like presentations, **THE AIM OF A HIGH-QUALITY PAPER is:**

⇒ **to communicate clearly and precisely well-supported new knowledge obtained through a research process.**

**High-quality publication teaches the reader:**

- (1) What are the key scientific and technical questions that are being addressed by the research (Background and Motivation),
- (2) Why are these key scientific and technical questions important (what difference will answering these questions make?),
- (3) What are the data that were generated to address the questions and how were the data generated at what level of precision (Methods),
- (4) How were the data analyzed to address the key questions asked (Results),
- (5) What is the key new knowledge and technology that was generated by the research (Conclusions & Take-away Messages).

# Aims: What are the Primary Reasons ~~to give a Technical Presentation~~ to publish a paper in a scientific journal?



## Communication & Teaching

- Teaching knowledge that you have obtained with your research
- Communicating the methods and validation of results

Therefore,

⇒ anything that interferes with communication and teaching should be avoided

⇒ anything that enhances communication and teaching should be used

# TEACH YOURSELF by Observing Critically

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An important learning tool:

## **OBSERVE OTHER WRITERS** SPEAKERS

- 1. Copy what is done well**
- 2. Avoid what is done poorly**

# An Example of Good Communication Skills

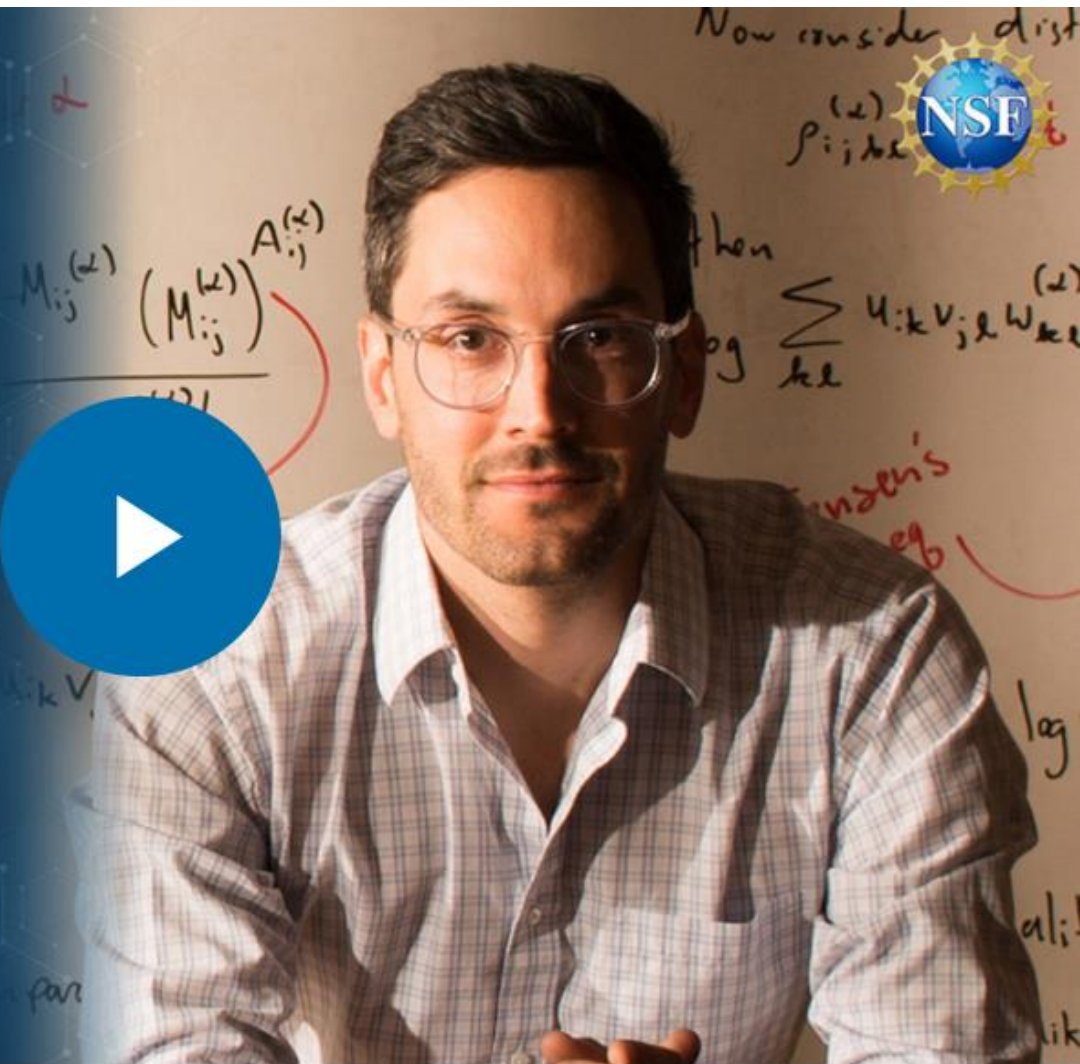


The Alan T. Waterman  
Award Winner



**Daniel B. Larremore, Ph.D.**

Assistant Professor of Computer Science  
University of Colorado Boulder



<https://www.nsf.gov/sbe/videos/larremore-2022-waterman-lecture-video.jsp>



# THE USE AND ART OF OUTLINING



## OVERALL THEME OF THE STUDY

- **Abstract:** write first to focus the paper

## ELEMENTS THAT SHOULD BE IN THE OUTLINE

- Background and Motivations: **Key questions**
- Methods: **Collection and Accuracy of the Data**
- **Analysis:** Generally in Results, but sometimes in Separate Sections
- Results: **Elements of new knowledge**
- Discussion: **Integration of new knowledge**
- Conclusions: **Organization of New Knowledge, Take-away Messages**

# THE USE AND ART OF OUTLINING

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## Examples