

Structure of a Research Paper

Karl F. Warnick
Department of Electrical and Computer Engineering
Brigham Young University
Provo, UT 84602

Abstract. The abstract should state the problem, describe your theoretical approach and/or experimental setup, and summarize the main new results.

1. Introduction

The introduction should tell the reader what the problem is, what has been done by others, and what you are going to do. Since many readers will not read further or only skim the body, it is the most important part of the paper. The basic parts are:

First paragraph - Identify the problem and its importance.

Next paragraphs - Describe previous work and cite the relevant literature.

(For a new graduate student, this is almost always the hardest section to write.)

Be clear about what others have done.

Concluding paragraphs - Outline your approach and summarize main results.

2. Body

The body of a paper presents background, derivations, description of experiments, and results. It consists of several sections, organized by how the material fits into the structure of the paper. Common sections in order of appearance are

Definitions (optional as a separate heading)

Include just enough to fix your notation and help the reader follow later sections.

Development of Design, Model, or Theoretical Results

Strike a balance between detail and conciseness – complexity is easy; clarity is difficult.

Cite as much as possible to avoid duplication; relate your approach to common principles.

Find a simpler way to present the results than your original derivation.

Experimental Description

Numerical/Experimental Results

2.1 Subsections. Top level section headings communicate the basic outline of the paper. The simpler and clearer the structure, the better. Use subsection headings to break up major topics within a section.

2.2 Figures. Figures stand out in a paper. Take advantage of this by using each figure to communicate a clear point. If possible, put that point in the figure caption after describing what the figure shows. Write the captions so that the figures tell your story by themselves.

3. Conclusions

The concluding section of a paper summarizes the main results of the paper (perhaps with more detail than in the abstract and introduction), makes recommendations for action in a larger context, and gives suggestions for further work.

4. References

[1] K. F. Warnick and W. C. Chew, "Numerical simulation methods for rough surface scattering", *Waves Rand. Media*, Vol. 11, No. 1, pp. R1-R30, 2001.

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