Technical Manuscript Writing for Doctoral Candidates

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Module 9. The Introduction Section

I. Parts of an Introduction

Introductions typically perform several important functions

- provide motivation for the work
- provide a review of the literature
- restate the purpose of the current work

Let us review the Introduction portion of the outline for each of the two study manuscripts. These portions are copied from the module on outlines.

Example 1. A Theoretical Manuscript
[Wang *et al.*, *Phys. Rev. E* **81** 061204 (2010)]

I. Introduction
- I.A. Background on Generating Coarse-Grained (CG) Potentials
  - I.A.1. Procedure for Generating CG Stretching/Bending Potentials (¶ 1, p 1)
  - I.A.2. This Procedure is inadequate for Non-bonded Potentials (¶ 2, p 1)
  - I.A.3. Existing Procedure #1 for Generating CG Non-bonded Potentials (¶ 3, p 1)
  - I.A.4. Existing Procedure #2 for Generating CG Non-bonded Potentials (¶ 4, p 1)
- I.B. Review of the Literature: The Orstein-Zernike Percus-Yevick (OZPY) integral equation
  - I.B.1. Introduction to OZPY (¶ 5, p 2)
  - I.B.2. Typical uses of OZPY (¶ 6, p 2)
  - I.B.3. Application of OZPY to simple fluids (¶ 7, p 2)
  - I.B.4. Application of OZPY to polymers (¶ 8, p 2)
  - I.B.5. Application of inverse OZPY to polymers (¶ 9, p 2)
  - I.B.6. Advantages of inverse OZPY approach (¶ 10, p 2)
- I.C. Restatement of purpose of paper (¶ 11, p 2)

Example 2. An Experimental Manuscript
[Liu *et al.*, *Chem. Eng. J.* **151** pp. 235-240 (2009)]

1. Introduction
- 1.1. Background on Boron (¶ 1, p 1)
- 1.2. Existing ways to remove boron from water (¶ 2, p 1)
- 1.3. Introduce Magnetic Assisted Adsorption Separation (¶ 3, p 1)
- 1.4. Restatement of purpose of paper (¶ 4, p 2)

We examine below how this structure of the introduction accomplishes the three tasks listed above.

I.A. Motivation

Introductions provide motivation for the work. Typically this motivation is a short paragraph. Overly long motivations are inappropriate. Motivations that try to convince the reader of common knowledge are also inappropriate and make the authors seems out of touch with reality. For example, in a manuscript on fuel cell research, it is okay to have one sentence that says something like,

Understanding the transport behavior of charge and water in the proton exchange membranes (PEMs) of fuel cells continues to be of importance for both current and future devices.

It is not appropriate to write a lengthy paragraph attempting to convince the reader of the need for research in alternative energy systems in the face of global climate change. The vast majority of your readers already accept that there is a need for research in alternative energy systems. They already accept global climate change. If they do not, it is unlikely that a paragraph written by you will do anything to change their mines. Motivate your research specifically. Don't cite references that global climate change is real. This is not a debate central to your research. Even if global climate change isn't real, the example sentence given above is true. Don't invite controversy in your paper on a subject that is not central to the manuscript.

Let us examine the motivation in the Introduction sections of our two study manuscripts.

Example 1. A Theoretical Manuscript

[Wang *et al.*, *Phys. Rev. E* **81** 061204 (2010)]

In this manuscript the motivation is contained in the first two paragraphs. It is somewhat combined with the review of the literature that follows in the subsequent paragraphs.

Example 2. An Experimental Manuscript

[Liu *et al.*, *Chem. Eng. J.* **151** pp. 235-240 (2009)]

The first paragraph of this manuscript contains the motivation.

I.B. Review of the Literature

Introductions provide a review of the literature. There is considerable latitude in how broadly literature is reviewed. My advice is as follows. First, you may want to briefly acknowledge that there is consider effort in a given field. These require either a list of citations or reference to a review, book or seminal article. As quickly as possible move from the general to the specific. Discuss the work of immediate relevance to your own work. Cite it. Editors often select reviewers from those cited in your references. If you cite relevant work, those authors are more likely to be selected for the review process. They presumably are highly competent in the field and will therefore be more able to offer useful suggestions leading to the improvement of the manuscript.

Let us examine the review of the literature in the Introduction sections of our two study manuscripts. We see two different approaches in terms of the breadth of the review. The first example is more lengthy and the second example is more direct.

Example 1. A Theoretical Manuscript
[Wang *et al.*, *Phys. Rev. E* **81** 061204 (2010)]
In this manuscript the motivation is contained in the first two paragraphs. It is somewhat combined with the review of the literature that follows in the subsequent paragraphs.

Example 2. An Experimental Manuscript
[Liu *et al.*, *Chem. Eng. J.* **151** pp. 235-240 (2009)]
Examine the second and third paragraphs of the introduction.

I.C. Restatement of the Purpose of the Manuscript
As mentioned in the Module on the purpose of manuscripts, typically the last paragraph of the Introduction is a restatement of the purpose of the manuscript.

Let us examine the restatement of the purpose of the manuscript in the Introduction sections of our two study manuscripts.

Example 1. A Theoretical Manuscript
[Wang *et al.*, *Phys. Rev. E* **81** 061204 (2010)]
In this manuscript the last paragraph of the Introduction is a restatement of the purpose.

Example 2. An Experimental Manuscript
[Liu *et al.*, *Chem. Eng. J.* **151** pp. 235-240 (2009)]
In this manuscript the last paragraph of the Introduction is a restatement of the purpose.