OCEN 678
Fluid Dynamics for Ocean and Environmental Engineering
Final Project: Understanding and Communicating Research

Date distributed : 11.5.2013
Date due : 12.10.2012 at 3:30 pm

Please submit your group project paper either in class or to my mail box (8th Floor, CE/TTI) by the date shown above. Please cite all references and follow the rules outlined in the course syllabus.

1 Introduction

The primary objective of OCEN 678, aside from teaching a fundamental knowledge of the basic theorems and methods in fluid dynamics, is to provide each student with a sufficient background to read and understand the research literature in fluid dynamics. Journal articles typically go into much more depth than what this introductory course can cover, but the fundamental principles and methods remain the same. Moreover, an objective of the Ocean Engineering graduate program in general is to master written communication. Indeed, all of you will write a thesis or final report and many of you will communicate the results of your research through a technical conference. To assess your progress toward learning the fundamentals of fluid dynamics and to give you practice at written communication, in this project you will write a six-page, conference-style paper based on two articles from the research literature. You will also create a poster similar to those presented at poster sessions for major research conferences. With this practice, you will be well on your way to mastering the research literature in your area and preparing your conference contributions.

As a short summary, the final project consists of the following steps:

- Select two related journal articles published since 1990 that address viscous flow theory, environmental fluid mechanics, potential flow theory, or stratified flow. The articles must be selected from a quality fluid dynamics journal and emphasize the analytical analysis of a flow field that is free of the effects of surface waves.
• Create a six-page, concise paper based on the results of these journal articles in the format of a conference proceedings. You must comprehensively cite all literature used in your paper. Because of the length of most journal articles, you will have to synthesize the results to the key points so that you can communicate something interesting and complete within the six-page limit. You may not copy any sentences by rote from the journal papers: all of the text must be your own.

• Create a poster for inclusion in a poster session summarizing the major points in your selected journal articles. Posters must fit within a 4 ft by 4 ft area. Remember that for posters, less is more: keep your fonts a reasonable size and emphasize only the key points of your topic. Citations to all literature references used are required, and no copying of text from your article is permitted.

On the scheduled final exam day you will submit a copy of your paper and display your poster in the Final Exam room.

2 Journal Article

The journal articles you select should illustrate how the tools we are learning in OCEN 678 are used to solve a research problem in fluid dynamics. The articles should address a problem in viscous flow theory, environmental fluid mechanics, potential flow theory, stratified flows or a combination of these topics. The solution presented in the articles should be analytical in nature (not numerical) and be something that each student in our course can comprehend after reading a six-page paper. Thus, the journal articles should develop some of the theories or applications used in our course.

As stated above, the articles must have been published since 1990 and come from a quality fluid dynamics journal. I recommend Physics of Fluids or the Journal of Fluid Mechanics. To help you find an article, you should use the library electronic resources to view the on-line versions of these journals. It is also helpful to use the Web of Science (an online journal article database available through the TAMU library webpage) to search for articles written by authors you already know. I am also happy to help in your search, but I want you to make a diligent attempt on your own first. Refer to the library research problem you already completed in Homework #1.

3 Paper

You will structure your in terms of organization, content, and length based on a standard conference paper contribution. While you would never submit someone else’s research in a conference setting, this is a good opportunity to practice conference-type writing at the beginning of your research career. Your paper must contain each of the following elements:
• **Title, Author list, and Abstract.** You should give a title to your paper, list the authors (your team members) and write a short abstract for your contribution. The abstract should only summarize work you will discuss within your six-page paper. Insert a footnote at the end of your title and reference the two journal articles you selected and on-which you based the paper. These should be listed in the footer on the first page following standard footnote format. All other citations will be parenthetical by author/year and listed at the end in a References section.

• **Introduction/Motivation.** You should use the opening paragraph of your paper to describe the problem that is posed in the article and put it in context as to why it is important. This is your chance to get the audience’s attention and interest and also explain basic background information that the average person in the audience may not know or remember, but is important to your topic. The second paragraph of the introduction should summarize the key background or literature relevant to your paper and put the paper in context of what else is known. By the end of this paragraph, the reader should know what this paper will address and how that will contribute to the other knowledge in the field.

• **Theory/Methods.** Here you should develop the theory and methods presented in the articles. You should start with first principles but quickly get into the details of the problem by recognizing that the reader should already know several key facts (e.g. what a compressible fluid is, boundary layer approximation, Newtonian fluid, etc.). You should state these facts, but not derive them. Instead, you should spend time deriving the key, new results of the research article and filling in any critical information that we have not yet covered in class. Please remember that you cannot cover everything in two journal papers within six pages. You will have to select one contribution and develop it so that I can understand your paper without referring back to the journal articles you are citing.

• **Results and Discussion.** Once the general theory is developed, you should present the most important results (objectively state what is observed) and discuss their significance (put these results into their proper context and explain their meaning). You will not have time to cover every detail. Thus, you should be selective and only present those results you find most important or interesting.

• **Conclusions.** The last section of your paper should summarize what you have already covered and draw the main conclusions. This is usually the hardest part, but a well-written journal article should have already done this work for you. Your job will be to extract the information and communicate it clearly to the class. This section should be structured in two paragraphs: the first a summary of the paper, and the second a statement of the key conclusions. It is important that you do not introduce any
conclusions at this point in the paper that are not already supported by the preceding text.

• **References.** All citations in your paper must be listed in the paper text as they occur using parenthetical author-year format. Each cited article should then be listed in the References section. An example of the citation formation is: Kundu et al. (2012) present the governing equations of fluid motion. For more information of proper citation and paraphrasing, please see:

  http://writingcenter.tamu.edu/for-faculty/teaching-writing/
  teaching-basic-skills/citation-and-documentation/plagiarism/

You have a total of six, single-spaced pages in Times Roman 11pt font to complete your paper, including title, abstract, content, figures, tables, and references. You may extract figures from your Journal articles or generate your own figures. Each figure extracted from an article or web resource must be properly cited.

Please follow one of the formats of the example papers posted on the Assignments page of the course website.

4 **Poster**

In addition to preparing the conference paper, you will also summarize the results of your journal articles in the form of a conference poster. The poster should fit in a 4 ft by 4 ft display area and include as a minimum a title, the names of the students preparing the poster, a complete citation to the selected journal article, and a clear summary of the important parts of the paper. Remember to use a decent font size. A poster is something that should get the attention of someone passing by, should communicate clearly, and not require a long period of reading. It is usually intended as a prop from which to explain your research project to interested people who stop by during a poster session. The poster should not be simply a copy-and-paste job from your paper: the text and figures serve a different purpose and should be new. Also remember, you are not permitted to copy any text from your selected article—text must be paraphrased and properly cited.

5 **Groups**

For this project, you will work within the groups already assigned for this semester. It is up to each individual group to determine their own division of labor.

6 **Important Milestones**

To keep you on task, the following schedule is suggested:
• 14. November 2013. Select a journal article and study the abstract. Use the reference list for the article to determine if a better paper on the same topic is available.

• 19. November 2013. Select a second article, study the abstract, and read both journal articles.

• 2. December 2013. Complete a draft of your seminar poster and start work on the paper.

• 10. December 2013. Project is due. Turn in a hard-copy of the paper and display the poster in class before the start of the final exam.

In order to ensure that the papers you select are appropriate, you must turn in a copy of your selected articles on 19 November. I will let you know by 22 November whether a different article is necessary.

7 Grading

This project is worth 10% of your total grade. Your grade for the project will be broken down as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Appropriateness of articles</td>
<td>20%</td>
</tr>
<tr>
<td>Quality of the written paper</td>
<td>20%</td>
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<tr>
<td>Correct paper and citation format</td>
<td>10%</td>
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<tr>
<td>Accuracy of paper text</td>
<td>30%</td>
</tr>
<tr>
<td>Quality of poster</td>
<td>20%</td>
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