

Plasma 2

Lecture 10: Journal Articles

APPH E6102y
Columbia University

Outline

- From *Academic Writing for Graduate Students*
- “Energetic particle modes of $q=1$ high-order harmonics in tokamak plasmas with monotonic weak magnetic shear,” by Zhen-Zhen Ren, et al, *Phys Plasmas*, 24, 052501 (2017); [<http://dx.doi.org/10.1063/1.4981935>]
- “Quasilinear diffusion coefficients in a finite Larmor radius expansion for ion cyclotron heated plasmas,” by Jungpyo Lee, et al., *Phys Plasmas*, 24, 052502 (2017); [<http://dx.doi.org/10.1063/1.4982060>]

Unit Seven

Constructing a Research Paper I

TASK ONE

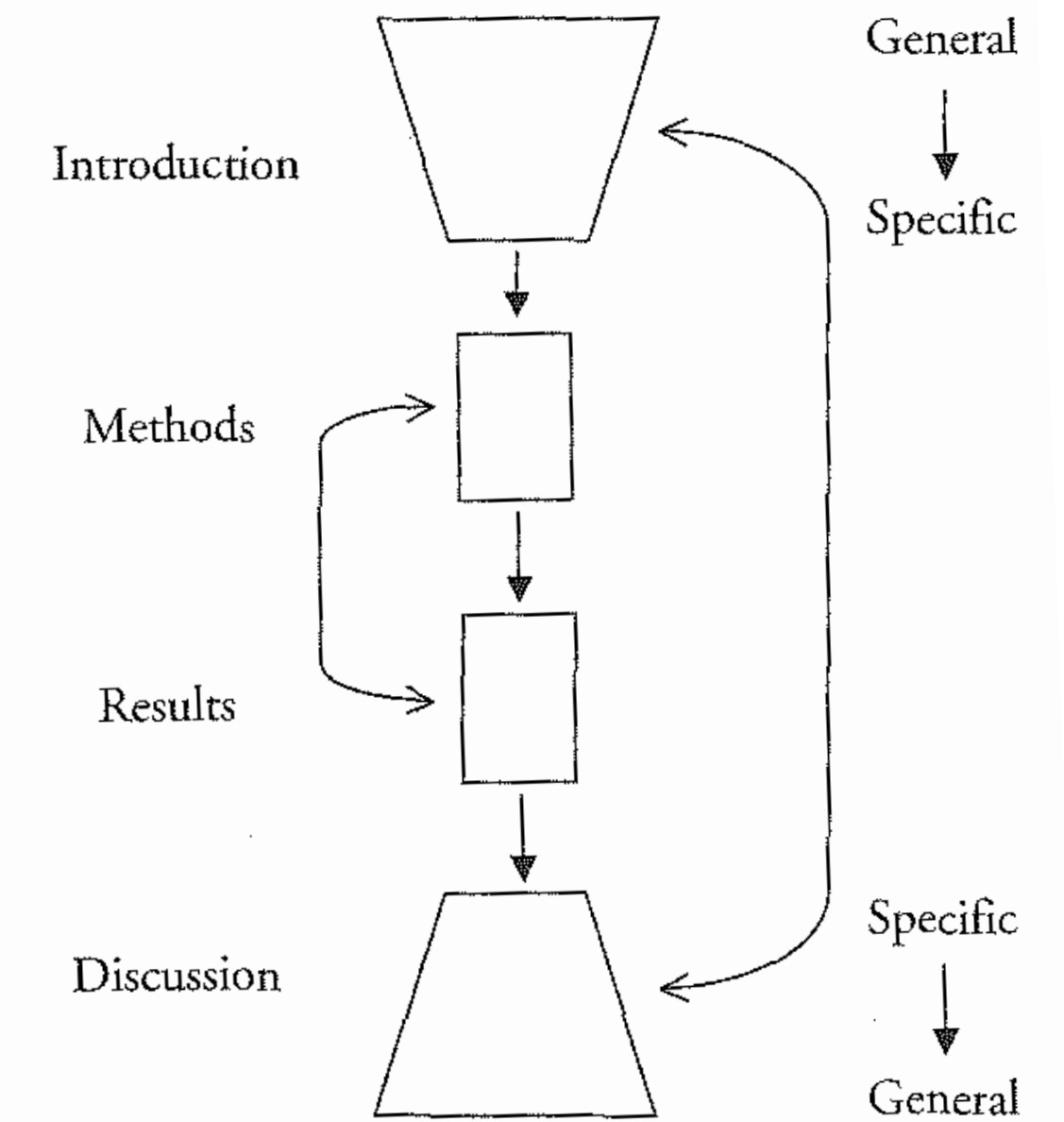
If you have not done so already, find 5–10 well-written published research papers that are typical of papers in your area of study. It does not matter whether these are seminal papers or where the research was conducted. We simply want you to have a small data set (a corpus) that you can analyze to gain some insights into the important characteristics of published work in your discipline.

TASK TWO

Read a review article of relevance to you. Does it include one of the aspects proposed by Noguchi? Or is the approach different? What kind of section headings does it have? How long is it? How many references does it have?

TASK THREE

FIGURE 14. Overall Shape of a Research Paper



TASK FOUR

TABLE 18. Frequencies of Selected Features in RP Sections

	Introduction	Methods	Results	Discussion
Present tense	high	low	low	high
Past tense	mid	high	high	mid
Present perfect	mid	low	low	mid
Passive	low	high	variable	variable
Citations	high	low	variable	high
Hedges	mid	low	mid	high
Evaluative comments	high	low	variable	high

TASK FIVE

hand. Can you determine from which of the four sections the sentences come? Mark each one I, M, R, or D. There are two from each section. Work with a partner.

TASK SIX

Work with a partner and decide which of the statements apply to the writing of a Methods section. Write A if you agree or a D if you disagree. If you are unsure, indicate this with a question mark (?).

- _____ 1. My Methods section should provide information that helps readers understand how and why my experiments or research was done.
- _____ 2. I should include information that would allow other researchers to reproduce my study and obtain largely similar results.
- _____ 3. I should describe methods that are standard in my field.
- _____ 4. My Methods section should make it easy for readers to understand and interpret my results.
- _____ 5. I should write my Methods section in a manner that allows readers to conclude that my results are valid.
- _____ 6. My Methods section should constitute a substantial portion of my paper.
- _____ 7. I should provide justifications for my choice of methods.
- _____ 8. I should discuss the limitations of my method in the Methods section.
- _____ 9. In my field, Methods sections typically include references to other studies.
- _____ 10. I should mainly use past tense in my Methods section.

If you and your partner are from different disciplines, you may have disagreed on some of the points in Task Six.

Administration (36 papers from each field). He proposed the existence of seven “moves” in Methods sections. Simply put, a *move* is a stretch of text with a specific communicative function. Moves are a matter of rhetoric. This concept is addressed in more detail in Unit Eight.

Move

Overview	a short summary of the research method, at or near the beginning of the Methods section
Research aims, questions, or hypotheses	a description of the research goals, the questions to be answered, or the hypotheses
Subjects and/or materials	in Business, Language and Linguistics, Law, and Public and Social Administration, a description of the people (groups of people) in the study; and in the sciences, a description of the materials, equipment, and so on
Location	a description of where the research took place and possibly why
Procedure	a discussion of the process used to obtain the data that was collected
Limitations	a focus on a shortcoming of the method, possibly accompanied by an explanation
Data Analysis	a description of how the data was analyzed

Adapted from Peacock, 2011.

TABLE 19. Frequency of Appearance of Individual Moves: Interdisciplinary Differences (% in which the moves appear)

Moves	Biology	Chemistry	Physics	Environmental Science	Business	Language and Linguistics	Law	Public and Social Administration
Subjects or materials	97	100	75	31	92	94	86	86
Location	36	8	0	67	47	58	58	75
Procedure	100	100	100	100	100	100	100	100
Data analysis	86	100	67	78	72	67	56	50
Limitations	6	0	0	69	44	19	28	6
Research aims or questions/hypotheses	3	0	6	11	36	22	58	67
Overview	3	0	0	50	25	19	42	54

Based on Peacock, 2011.

TASK SEVEN

Discuss these questions about Table 19 with a partner.

1. How might you explain the different percentages for location?
2. Why do you think methods in the sciences do not generally include overviews?
3. Which field, would you say, is most similar to Business in terms of Methods sections?
4. In four fields, limitations were given in less than 10% of the methods. Is this because there were no limitations? Or is there another possible reason?
5. What surprises you most about the table?

TASK EIGHT

Here is the Methods section from a paper investigating hypothetical

1. Which of the moves described in Table 19 can you find in the method description?
 2. Do you think the level of detail is sufficient or insufficient? In other words, is there enough information to allow the study to be adapted or replicated by others? If not, what would you need to know?
 3. Do you think the sample scenarios are needed? Should the authors have described how the final sample was derived?
 4. How is the information organized? What subheadings could you add to help readers? Where would you place them?
 5. What verb tense dominates? Why did the authors choose this tense? Could another tense have been chosen?
 6. How do the authors maintain a good flow of ideas in the first paragraph? Do they follow this same strategy in the final paragraph?
 7. Does active or passive voice dominate? Why is this the case?
 8. What verb tense (past or present) and voice (active or passive) dominates in the Methods sections of the papers that you analyzed? Why?
 9. You have been asked to lead a discussion focusing on the method used in this paper. What points would you make?
 10. Analyze 3–5 papers from your reference collection in terms of the move structure in the Methods sections. Are the moves the same as those proposed by Peacock or are there others?
-

In effect, *condensed* methods state what the researchers did with little elaboration or justification. *Extended* methods present readers with a rationale of why and how researchers did what they did. You can elaborate your Methods by

- providing useful background knowledge (e.g., through definitions and examples).
- using descriptions of procedural steps, rather than citations and/or acronyms.
- including a number of justifications (e.g., *To determine this value, we . . .*).
- using cognitive or volitional verbs (e.g., *We believed; We wanted to*).
- including *by + -ing + verb + how* statements (*This was done by reversing the order*).
- employing a wide range of linking words and phrases (e.g., time expressions, such as *next* or *prior to*).

If your methods are fairly standard you may

- assume readers have relevant background knowledge.
- sometimes use citations or acronyms to refer to processes (e.g., *A corpus was designed following Römer (2010)*).
- have few justifications.
- use few or no cognitive or volitional verbs.
- choose to avoid *by + -ing + verb + how* statements.
- employ few linking phrases.

TASK NINE

Looking again at the Methods description in Task Eight, would you say it is condensed, extended, or somewhere in between? Now look at these two extracts from Methods sections. Would you say they were condensed, extended, or somewhere in between? How did you decide?

TASK TEN

Choose one task to complete.

1. Mei-Lan's advisor says, "This is good, but I am afraid your draft is too long; it's nearly 150 words. 100 words would be much better. Can you shorten it, focusing more on what you did?" Edit Mei-Lan's draft for her.
 2. Write (or re-write) your Methods section for some of your own research.
 3. Alternatively, write up your method for how you created your reference collection of articles.
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Data versus Results

To begin, although we often use the terms *data* and *results* interchangeably, they are, in fact different (Annesley, 2010). This distinction is important because novice writers may include data in the Results section but fail to provide results, which may lead to a negative evaluation of a study. Data consists of facts and numbers, and these are generally presented in tables and figures. Results, on the other hand, are “statements in the main text that summarize or explain what the data show” (Annesley, 2010, 1067). Data can be manipulated to obtain a result. A result is a message that can, for instance, give readers a sense of whether one value is higher or lower than another or some data differs from other data in some significant way. A result is supported by data (Wright et al., 1999). Here are two examples of

Results versus Discussion

Another important consideration is the difference between results and discussion. As you may know, many guidelines for writing the Results section specify that this section should present only results and include no interpretation or discussion. If, however, you have ever tried to strictly adhere to this, you know it is hard to avoid commenting on the results as you present them. This, of course, is not a problem if you are writing for a journal that combines Results and Discussion sections. However, when Results and Discussion are separate sections, a major challenge is determining what to include in each, what level of generality is appropriate for each, and what type of commentary works best in each. To help with this, we turn to Task Eleven.

TASK ELEVEN

TASK TWELVE

Take your small collection of research articles from your own field, and scan them for location statements, coding them as done in Tables 21 and 22. Make a table and write up your results; include comparisons with Tables 21 and 22 as appropriate. Finally, consider whether or not your results support our preliminary hypothesis.

TASK THIRTEEN

Now read these three versions of a partial write-up of the results for this search. What are the strengths and weaknesses of each? What do you like and not like? Discuss with a partner.

TASK FOURTEEN

Commentary in Results Sections

The question of whether the Results section should include commentary—and of what kind—is not easy to answer. In fact, you will find different answers in different writing manuals; further, you may get different views from your instructors, advisors, and supervisors. The more traditional view is that the Results section of an RP should simply report the data that has been collected; that is, it should focus exclusively on simply describing the actual results and should do so using the past tense. Another view would accept some interpretation of results but would suggest that more wide-ranging observations should be left until the Discussion or Conclusions. A third view accepts the fact that authors often include commentary in their Results section because they are aware of their audience. They can *anticipate* that their readers may be thinking, “Why did they use this method rather than that one?” or “Isn’t this result rather strange?” For obvious reasons, authors may not want to postpone responding to such imagined questions and critical comments until the final section.

TASK SEVENTEEN

Which of Thompson's types are acceptable in a Results section, or do you think the category is better placed in the Discussion section? If acceptable for Results, write R; if it is better for Discussion, write D.

- 1. Admitting difficulties in interpretation
 - 2. Calling for further research
 - 3. Citing agreement with previous studies
 - 4. Commenting on the data
 - 5. Interpreting the results
 - 6. Justifying the methodology
 - 7. Pointing out discrepancies
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TABLE 24. Commentary Found in Results Sections in Biochemistry Papers

Type of Commentary	Number of Papers (max. = 20)
Justifying the methodology	19
Interpreting the results	19
Citing agreement with previous studies	11
Commenting on the data	10
Admitting difficulties in interpretation	8
Pointing out discrepancies	4
Calling for further research	0

TASK TWENTY

Produce a Results section from your own work (or part of a Results section if your work is extensive).

Unit Eight

Constructing a Research Paper II

Introductions

It is widely recognized that writing Introductions can be slow, difficult, and troublesome for many writers. A very long time ago, the Greek philosopher Plato remarked, “The beginning is half of the whole.” Indeed, eventually producing a good Introduction section always seems like a battle hard won.

Writing the Introduction of an RP is particularly troublesome. In some kinds of texts, such as term papers or shorter communications (including case reports), it is possible to start immediately with a topic or purpose statement, as in these examples.

The purpose of this paper is to

This paper describes and analyzes

My aim in this paper is to

In this case report, we discuss

Reviewing Manuscripts

How to improve, or
Respectively, why it should not be published.

A Few Thoughts on Manuscript Reviews for a Journal

You may at some point be asked to review a manuscript that has been submitted for publication. Journals generally provide you with guidelines for evaluating the manuscript. In your first few reviews, you may want to adhere to the guidelines, but as you gain more experience, you should also have confidence in your ability and develop your own reviewing style. In the guidelines of one journal with which John and Chris are very familiar, reviewers are asked to consider such things as the level of interest others in the field might have, the originality of the manuscript, the author's familiarity with the field, the appropriateness of the methodology and statistical analyses, the appropriateness of the conclusions, and writing style. Regardless of the quality of the article that you are reviewing, as with all other forms of critique, it is important to be fair and to suggest improvements that could actually be made. For instance, if a study is a secondary analysis of data collected for another purpose, it may not be fair to suggest that the authors collect additional data. Your job is not to find as much fault as possible with a manuscript, but to offer feedback that could either improve a manuscript that is potentially publishable or respectfully explains your opinion why it is not. Reviews that are disrespectful can discourage novice scholars and frustrate those who have experience. We suggest that you consider yourself as being in the role of a peer advisor engaged in a written dialogue with the author, albeit a dialogue that may be one-sided if you do not recommend the manuscript for publication. If you happen to be on the receiving end of a manuscript for review, you may want to consult *Navigating Academia*, which is published by the University of Michigan Press (Swales and Feak, 2011).

Energetic particle modes of $q = 1$ high-order harmonics in tokamak plasmas with monotonic weak magnetic shear

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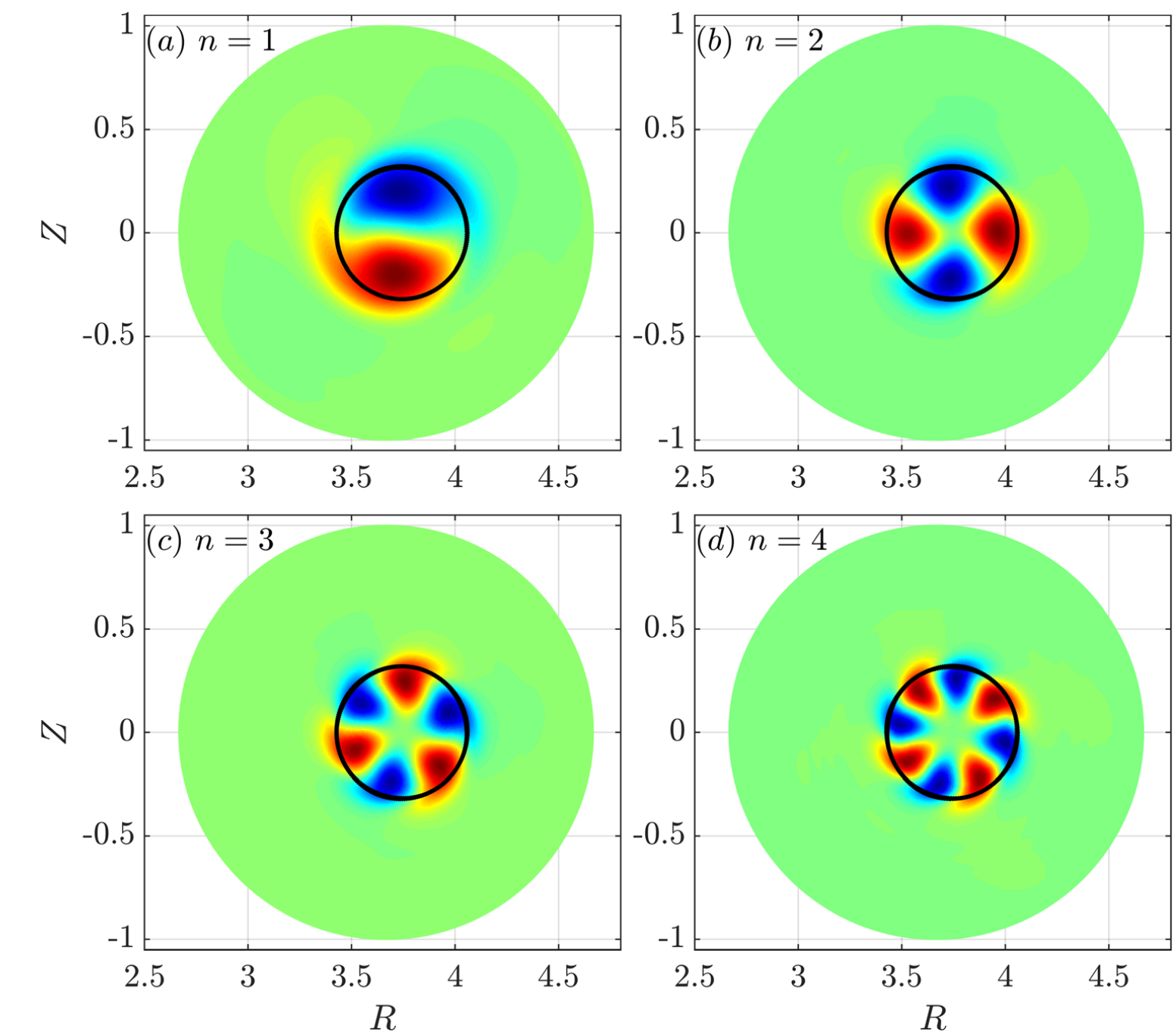
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Linear and nonlinear simulations of high-order harmonics $q = 1$ energetic particle modes excited by trapped energetic particles in tokamaks are carried out using kinetic/magnetohydrodynamic hybrid code M3D-K. It is found that with a flat safety factor profile in the core region, the linear growth rate of high-order harmonics ($m = n > 1$) driven by energetic trapped particles can be higher than the $m/n = 1/1$ component. The high $m = n > 1$ modes become more unstable when the pressure of energetic particles becomes higher. Moreover, it is shown that there exist multiple resonant locations satisfying different resonant conditions in the phase space of energetic particles for the high-order harmonics modes, whereas there is only one precessional resonance for the $m/n = 1/1$ harmonics. The fluid nonlinearity reduces the saturation level of the $n = 1$ component, while it hardly affects those of the high n components, especially the modes with $m = n = 3, 4$. The frequency of these modes does not chirp significantly, which is different with the typical fish-bone driven by trapped particles. In addition, the flattening region of energetic particle distribution due to high-order harmonics excitation is wider than that due to $m/n = 1/1$ component, although the $m/n = 1/1$ component has a higher saturation amplitude. *Published by AIP Publishing.*

[<http://dx.doi.org/10.1063/1.4981935>]



Quasilinear diffusion coefficients in a finite Larmor radius expansion for ion cyclotron heated plasmas

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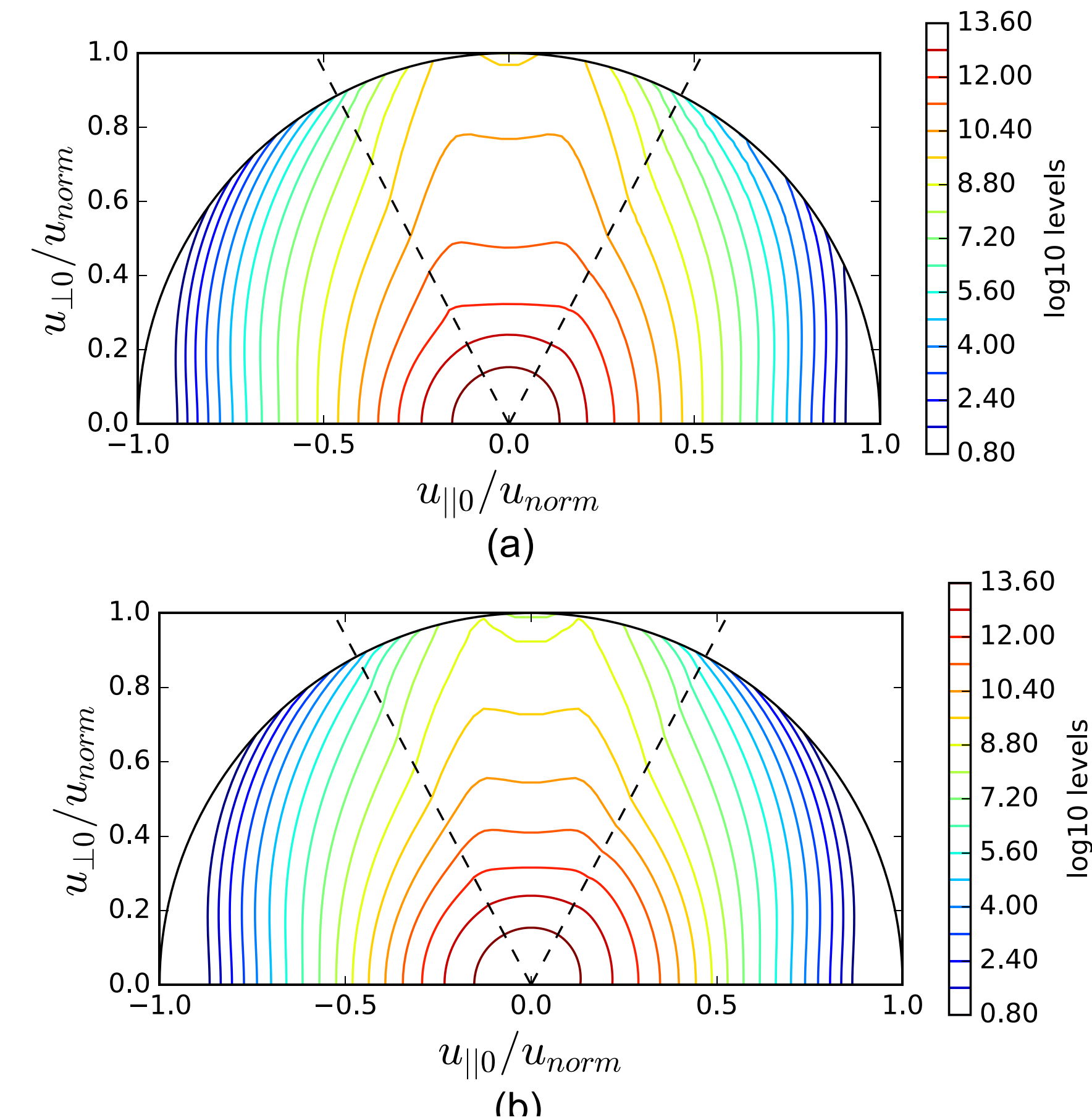
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In this paper, a reduced model of quasilinear velocity diffusion by a small Larmor radius approximation is derived to couple the Maxwell's equations and the Fokker Planck equation self-consistently for the ion cyclotron range of frequency waves in a tokamak. The reduced model ensures the important properties of the full model by Kennel-Engelmann diffusion, such as diffusion directions, wave polarizations, and H-theorem. The kinetic energy change (\dot{W}) is used to derive the reduced model diffusion coefficients for the fundamental damping ($n = 1$) and the second harmonic damping ($n = 2$) to the lowest order of the finite Larmor radius expansion. The quasilinear diffusion coefficients are implemented in a coupled code (TORIC-CQL3D) with the equivalent reduced model of the dielectric tensor. We also present the simulations of the ITER minority heating scenario, in which the reduced model is verified within the allowable errors from the full model results. *Published by AIP Publishing.* [<http://dx.doi.org/10.1063/1.4982060>]



Next Class

- Class dismissed: Feb 26 & Feb 28 (Prof. Mauel away at NAS meeting.)
- March 5-7: Introduction to drift waves in magnetized plasma
- March 5-7: Please send me an abstract and outline of your “wave-particle” midterm paper
- March 12-16: **Spring recess**
- Monday, March 19: **Midterm papers due**