Questions that require extended answers beyond the available time during the class L1-20150912:

1. **What English accent do you have?**

   My English accent depends on from whom I have learned English. It is well known that a baby first learns via imitation, feedback and repetition from his or her parents who provide care and nourishment. Since I have learned English from various sources, my English accent is varied. Often times my accent becomes the accent of whomsoever I am speaking to, since the process of imitation, feedback and repetition continues even today.

   I have observed often that a speaker's accent, if it is persistent, often results from a lack of real feedback regarding accent to the speaker. The feedback loop consists of (1) listening to the sounds of the language spoken by another as well as by yourself, (2) recognizing the differences in the sounds, and (3) then imitating the sounds more nearly correctly. This loop should continue whenever you speak and/or listen to others speak. Therefore, to be a good speaker, one must first be a good listener. To be a good listener, one must pay attention. Isn't this what we should do anyway, all the time?

2. **What has been your major contribution to fusion energy research and development (paraphrased)?**

   To properly answer this question requires a clarification of the meaning of "major contribution." Fortunately, this topic has been of high interest among the academics (professors, researchers, etc. of all scientific and technical topical areas). A commonly used measure of this is called the "h-index," which aims to quantify the popularity or impact of the published articles in the field of interest. The definition of the h-index from Wikipedia (file: h-index Wikipedia.pdf), and a more detailed discussion of its utility in comparison with an earlier measure called ISI Journal Impact Factor (JIF) (file: 2008-Harzing-Google Scholar h-index vs. ISI Journal Impact Factor.pdf), are included in the same folder for reference.

   In short, h-index equals the number of published papers with the same or higher number of citations. The more papers you publish with higher citations by others of the paper, the higher becomes the h-index. A very famous physicist Hawkings today is said to have an h-index of 64. Most Nobel Prize winners in scientific fields have h-indices in the range of 30 to 50. This is probably because these winners may have a few papers that are cited very highly (maybe by the hundreds or even thousands because they are the winning papers). Nevertheless, his or her papers that are cited for 30 times or more only add up to 30 in number, etc.

   Further, many devoted to magnetic fusion energy research and development have achieved h-index near or above 30, without winning a Nobel Prize so far. Many of their contributions go beyond what the h-index would imply, such as in

achieving major fusion energy R&D projects. I am sure there are also those who have both high h-index and large contributions in major fusion research projects.

Fortunately, my papers appeared to have obtained two years ago an h-index of 30, with the highest citations being near or over 300. Unfortunately perhaps, one has to dive into more detail to determine whether these papers contained some "major contributions."

3. What mathematical knowledge do we need to do research on fusion science? And what mathematic tools do you usually use?

I mentioned during the class examples of "applied mathematics" and "kinetic statistical theory" in the mathematics knowledge used in "modern physics" that I learned during graduate school (and maybe still being taught today). However, this question deserves a much extended answer to cover the breadth of the mathematical knowledge used in magnetic fusion energy research and development today.

I will see if I can develop a two-hour lecture on this topic and include it in this semester.

4. Comparing with standard tokamak, what advantages does spherical tokamak have? And what's the philosophy of spherical tokamak research?

I would like to consider this question thoughtfully before providing an appropriate reply. At the present, I would suggest that the present magnetic fusion energy research and development community is not yet ready to address the subject of spherical tokamak adequately, in my personal assessment.

In any field of research and development, any proposed relative advantages can only be projective and suggestive. Given reasonable logic in its philosophy, these proposed advantages cannot be proven or unproven unless adequate opportunities are given to testing, hopefully to gain new discoveries, which in turn motivate further testing. The new knowledge and understanding obtained, whether confirming a new prospective advantage or not, will become a part of the continuing progress of our endeavors.

This can be likened to an unexplored island with possible treasures (or tar pits) to be discovered. We will never find out if there are any treasures to be had without first landing and exploring on that island. This first step sometimes requires uncommon courage and vision.