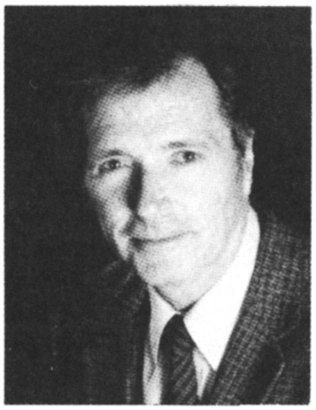
COMMENTS



The staff of *Fusion Technology* (*FT*) is quite pleased that Emilio Panarella has agreed to serve as Guest Editor for a special section in this issue concerning spherical plasma configurations. Dr. Panarella is ideally qualified to do this because as is pointed out in the Guest Editor's Preface, he serves as Chair of the Spherical Plasma Configuration Group of the American Physical Society. He did an excellent job of obtaining papers, working on the review process, and coordinating production of the special section.

Why spherical plasma configurations? Of course, inertial confinement fusion (ICF) involves spherical plasmas. In contrast, a majority of the work in magnetic confinement involves toroidal plasma configurations, with the tokamak being the leading example. Alternative configurations, such as the spherical pinch, involve a more spherical-like scheme. Indeed, one paper in the section, which discusses ball lightning, suggests that more effort should be devoted to investigating these configurations because they follow nature's course.

Several papers are concerned with the spherical pinch, which has not received much attention to date. One reason is that the spherical pinch is not generally considered to be a major contender for near-term fusion power. But on the other hand, it is a good example of fusion-inspired research that has led to important near-term applications—in this case, to a commercial pulsed-X-ray source.

Because ICF research is widely represented in the literature, Dr. Panarella has included here only selected papers that deal with unique aspects of ICF. Magnetized target fusion, for example, has been discussed over a number of years, but the paper provided here offers an overview of the concept that should be of particular value to readers who are interested in the approach but are not working on directly related research. In addition, several papers in the special section provide further insight into shock wave phenomena in ICF-like systems.

This issue also contains interesting and important papers in the regular issue section. In addition to the papers that deal with fusion science and technology topics, there is a paper that explores the use of a tokamak fusion device as a neutron source for a weapons materials transmutation facility. The use of a tokamak as a neutron source is, of course, a familiar topic that has been studied in the past as a "fission-fusion hybrid" and also as a "volumetric neutron source" for fusion materials damage studies. With the demonstrated success of deuterium-tritium fusion in both the Joint European Torus (JET) and the Tokamak Fusion Test Reactor (TFTR), reconsideration of such applications now seems timely. The point is that fusion research may need to provide interim applications, like these, to sustain the interest and to maintain the funding necessary for the long-term development of commercial fusion power.

Current knowledge of tokamak plasma confinement appears to be adequate for the task. The main issues involve developing a reasonable duty cycle or a steady-state operation and providing adequate availability over the time period required. Indeed, key physics issues for steady-state operation via current drive have received tentative approval for the Tokamak Physics Experiment (TPX) study. This would be an important step toward the development of a usable neutron source. However, there is not a coordinated program that addresses the technology issues that would be necessary to ensure dependable long-term operation. If interest develops in a tokamak neutron source, an intense research and development program on these technologies would have to be initiated. Unfortunately, it appears that the neutron source issue has not gained much attention. First, there has been virtually no funding for that allotted in the national fusion program, and second, one of the key applications, namely, breeding fissile fuel for fission reactors, has not been commercially attractive because of the general lack of demand for additional sources of fission reactor fuel in the near term. As some have put it, uranium appears to be a "glut" on the market—such as crude oil appears to be! This analogy is perhaps more insightful than it first appears. In my view, the low present-day cost of petroleum fuels is an artificial short-term situation that has lulled us into an unfortunate feeling of security. The same may be true of the uranium fissile fuel situation, especially if a longer term, global energy scenario is considered.

Despite these arguments, however, the development of a fusion-based fissile fuel breeder will probably not gain much momentum in the near term. However, the need for a volumetric neutron source to study fusion materials and also the need for transmutation facilities to process plutonium and transuranic materials represent important opportunities in the immediate future. It would appear that the tokamak neutron source may compete well in both applications, and serious consideration should be given to expanded studies of this possibility. The paper on the transmutation facility in this issue will hopefully stimulate such renewed interest. I invite readers to consider contributing additional papers that deal with the neutron source topic.

Finally, I call your attention to the new cover for *FT*, which appears for the first time with this issue. The decision has been made to adopt standard art that will be used for all issues rather than use individual artwork for each issue. This represents part of a cost-reduction strategy undertaken by all American Nuclear Society journals. Elimination of author photographs, instituted in the March issue, was a first step in this effort. I know that many of our readers enjoyed these special features of the journal, but I hope you will find the new format fresh and attractive. As always, the Letters to the Editor section welcomes readers' comments.

George Miley