GUEST EDITOR'S COMMENTS

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The idea concerning this special issue of *Fusion Technology* (*FT*) on thermal hydraulics of fusion devices took shape during the Third International Symposium on Fusion Technology in Los Angeles, California, in July 1994. I was having lunch with Prof. Miley, and I mentioned that heat transfer does not receive the attention it deserves in the fusion community. George remarked, "Why don't you help me put together a special issue of *Fusion Technology* on this subject?" Immediately, we both began work on the project. A group of thermal-hydraulic specialists interested in fusion already exists, and this group has had four meetings (San Francisco, California, 1991; Rome, Italy, 1992; Cadarache, France, 1993; and San Diego, California, 1994). However, these meetings were for invitees only and did not receive very wide distribution. Contributions to this issue of *FT* were sought from this group and also from fusion groups around the world.

With few exceptions, most fusion machines existing today are short-pulse machines and did not provide a serious challenge to thermal-hydraulic experts. However, as the pulse length increases and peak heat flux on the plasma-facing components increases, thermal hydraulics is becoming critical. Tore Supra has already tried to solve some of the difficulties of long-pulse operation, although the peak heat flux is not very large. Similarly, the Steady-State Tokamak currently being designed in India has very low peak heat flux.

This is a time when international cooperation is of paramount importance for progress in fusion. This *FT* is an excellent example of international cooperation where papers from several countries have been contributed. We have contributions from experts who are working on most major machines [DIII-D, Joint European Torus (JET), JT-60, and Tore Supra] and are from national laboratories (Sandia National Laboratories, Albuquerque, and ENEA), industry (Thermacore, Creare, and Ship Research Institute), and universities (Berlin, Prairie View, and Tsukeba). The current coolant of choice for most machines is water; consequently, a number of papers deal with the subject of critical heat flux for water. Both mechanistic models and correlations are discussed. The challenge of increasing the critical heat flux without using very large flow velocities necessitates the use of enhancement methods, and these are presented. There has been considerable argument during last three years about the choice of coolant for the International Thermonuclear Experimental Reactor (ITER). Helium cooling has many advantages in terms of safety considerations. The ITER management has chosen water cooling to limit the uncertainties of helium cooling. The three papers in this *FT* that are devoted to helium cooling of fusion components demonstrate such a feasibility. The paper on Tore Supra is an excellent review of experience with high-heat-flux components. Another paper on Tore Supra discusses the effect of imperfect brazes on thermal hydraulics.

Before closing, I want to put forth my pet peeve about how we work in the fusion community. Thermal-hydraulic specialists in fusion try to design the components to satisfy the constraints specified by the physicists. However, the physicists must state realistic conditions. A good example of this is the current ITER design. It is required that the minimum temperature of coolant channels be more than 140°C. The coolant selected is water. However, the peak heat flux in the divertor has been stated to be as large as 25 MW/m^2. All the thermal-hydraulic experts will agree that these conditions are impossible to satisfy. I think that all physicists in fusion should be required to read this issue of *FT* to improve their understanding of thermal hydraulics.

I want to extend my sincere thanks to Ms. Sherry Lopez and Ms. Celia Elliott for their help with this task. I also wish to thank the reviewers for their timely and extensive comments on the papers. And, of course, this *FT* would not have been possible without the contributors.