



In this issue of *Fusion Science and Technology (FS&T)*, we are pleased to bring you the contributions from the Joint European Torus (JET), located at the UKAEA Culham Science Center, near Oxford, United Kingdom. *FS&T* has been working with international tokamak groups to contribute to series of special issues to recognize and highlight the science and technology contributions to a next-step burning plasma device (ITER). All major tokamaks around the world have been participating, and the series will have a long-lasting value to the fusion community, from desktops to classrooms. With ITER (the Latin word “the way”) under construction at Cadarache, France, this series of tokamak special issues is more timely than ever and will serve to help

attract and educate a new generation of scientists and engineers who will be the ones to build, run, and scientifically exploit ITER—reaping the benefits of all that has been achieved in the international fusion program.

We are deeply indebted to the JET Team and to the contributing authors for their efforts in preparing this special issue for the readers of *FS&T*. Eleven chapters/papers included in this issue survived the rigors of the peer-review process, courtesy of 30 international reviewers. The papers cover the period of JET operation under the JET Joint Undertaking (1978–1999) and the European Fusion Development Agreement (EFDA) (2000–present) phases. They are either original contributions or informative reviews of the JET physics research results, with relevance to ITER. Certainly, this issue could not have been possible without the initial agreement with Dr. Jérôme Pamela and continued involvement and encouragement from Dr. Francesco Romanelli, past and present JET directors, respectively. Our thanks are due Dr. Claude Gormezano for his help with the coordination of the issue and for serving as the guest editor. This was Dr. Gormezano’s second guest editorship with the *FS&T* tokamak series, JET and FTU (Frascati Tokamak Upgrade), a gracious act of commitment and dedication.

The JET issue is the eighth in the *FS&T* special issue series of tokamak experiments. The first seven in the series are as follows:

- “Special Issue on JT-60,” *FS&T*, Vol. 42, No. 2/3, September/November 2002;
- “Special Issue on ASDEX Upgrade,” *FS&T*, Vol. 44, No. 3, November 2003;
- “Special Issue on Frascati Tokamak Upgrade (FTU),” *FS&T*, Vol. 45, No. 3, May 2004;
- “Special Issue on TEXTOR,” *FS&T*, Vol. 47, No. 2, February 2005;
- “Special Issue on DIII-D Tokamak,” *FS&T*, Vol. 48, No. 2, October 2005;
- “Special Issue on JFT-2M Tokamak,” *FS&T*, Vol. 49, No. 2, February 2006;
- “Special Issue on Alcator C-Mod Tokamak,” *FS&T*, Vol. 51, No. 3, April 2007.

JET came into operation in 1983. *Fusion Technology (FT)*, the predecessor of *FS&T*, published a full issue titled “Design, Construction, and First Operational Experience on the Joint European Torus (JET),” *FT*, Vol. 11, No. 1, January 1987, providing an excellent summary of the engineering aspects of JET.

JET has been a major step on the way to a fusion reactor and is the largest tokamak in operation in the world to date. With its D-shaped plasma cross section and a divertor, its plasma volume of up to 100 m<sup>3</sup>, its plasma current of several mega-amperes, its unique experience with deuterium-tritium (D-T) operation, and its tritium- and remote-handling

capabilities, JET broke many world records in fusion, including a record of 16 MW of fusion power during D-T experiments in 1997.

During its quarter century of operation, JET has been carrying out a number of innovative research techniques and technologies that are important for burning plasmas (ITER). Some of this research (covered in this issue) includes high-performance (H-mode) scenarios, advanced tokamak scenarios, burning plasma physics, plasma boundary and scrape-off layer physics, disruption studies, performance limiting magnetohydrodynamic stability, physics studies with the additional (radio-frequency and neutral beam) heating systems, and core transport studies. Some of JET's state-of-the-art plasma diagnostics capabilities are covered in a recent *FS&T* special issue, "Plasma Diagnostics for Magnetic Fusion Research," *FS&T*, Vol. 53, No. 2, February 2008.

The JET Team, made up of EFDA and international partners, collaborates on joint experiments to resolve a number of key issues related to ITER. The breadth and depth of the JET research program and its contributions to ITER are clearly evident in the papers contained in this issue. We wish them all continued success and look forward to their future contributions.

This special issue is dedicated to the outstanding team of scientists, engineers, and support staff that contributed to the success of the JET program.

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