

Preface

Second IAEA Technical Meeting on Fusion Data Processing, Validation, and Analysis

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It is with great pleasure that I am able to provide an introduction to the papers from the Second International Atomic Energy Agency (IAEA) Technical Meeting (TM) on Fusion Data Processing, Validation, and Analysis (IAEA-TM2017). IAEA-TM2017 was held at the Samberg Conference Center on the Massachusetts Institute of Technology (MIT) campus in Cambridge, Massachusetts, over a three-and-a-half-day period spanning May 30–June 2, 2017. This meeting was a great success, bringing together approximately 70 scientists from around the world to discuss cutting-edge work involving modeling and analysis of fusion data. Taking advantage of the proximity to the MIT campus, some members from the greater MIT community also participated in the meeting, providing a unique opportunity to identify cross-cutting aspects in the field of fusion energy with related fields, such as computational fluid dynamics and applied math.

Support for IAEA-TM2017 was generously provided by the U.S. Department of Energy (DOE) and the MIT Plasma Science and Fusion Center. I would like to specifically thank Dr. John Mandrekas at the DOE for his support as well as Professor Dennis Whyte for financial and logistical support for hosting this meeting on the MIT campus. Superior administrative support was provided by Jessica Coco. Jessica worked on the setup for both the meeting arrangements and the IAEA banquet, neither of which would have been possible without her hard work. I would like to thank the IAEA organization for their support of this meeting with a specific thanks to Sehila Gonzalez, the IAEA Scientific Secretary, for guidance through the process of chairing the meeting. Finally, I would like to thank the American Nuclear Society journal *Fusion Science and Technology (FST)* and Dr. Nermin Uckan (editor emeritus of *FST*) for coordinating and publishing the papers from IAEA-TM2017. I appreciate all the time and effort Dr. Uckan and the *FST* staff put in to make this special issue possible.

Selection of the invited speakers and formation of the technical program were arranged by the International Program Advisory Committee (IPAC), and it was through their hard work that IAEA-TM2017 was a success. Members of the program committee for this meeting span the globe and include Didier Mazon (France), Rainer Fischer (Germany), Andreas Dinklage (Germany), Shin Kajita (Japan), Min Xu (China), Stan Kaye (United States), Nathan Howard (United States), Jesus Vega (Spain), and Geert Verdoolaege (Belgium).

The topical areas of IAEA-TM2017 largely overlapped with those of the previous IAEA-TM with some modification to address new and emerging topics. The topics for this meeting, selected by members of the IPAC, were as follows: uncertainty quantification; model selection, validation, and verification; probability theory and statistical analysis; inverse problems and equilibrium reconstruction; integrated data analysis; real-time data analysis; machine learning; signal/image processing and pattern recognition; experimental design and synthetic diagnostics; and data management. These topical areas were grouped into seven distinct sessions spanning the meeting period. Each session was highlighted by an invited presenter selected by the IPAC. The invited speakers for this iteration of IAEA-TM were Michael Cianciosa (Oak Ridge National Laboratory), Mark Chilenksi (MIT), Giuseppe Ratta [Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas (CIEMAT)], Jonathan Citrin [Dutch Institute for Fundamental Energy Research (DIFFER)], Mirko Salewski (Technical University of Denmark), Shin Kajita (Nagoya University), and Youseff Marzouk (MIT). Each of the seven sessions concluded with a 30-minute discussion session to summarize and explore topics that arose naturally from the presentations.

With the operation of ITER now on the horizon, there is a worldwide emphasis on model validation, integrated modeling, and applying cutting-edge methods

for the analysis of fusion data. It is my hope that the IAEA-TM conference series will continue to foster the development of best practices for integrated modeling, model validation, and data processing that will ultimately be used to inform the operation of ITER and

beyond. The 17 articles included in this special issue of *FST* represent a good sampling of the many exciting papers submitted to the technical meeting, and I look forward to many more meetings in the future in this IAEA-TM series.