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## Preface

We, the co-editors of this book, would like to introduce the short history of how this book came to be published in the first place.

We are the founders of a new journal of nuclear safety from East Asia. We started to prepare for publishing a quarterly Web journal called the *International Journal of Nuclear Safety and Simulation* (IJNS) in 2009 with the financial support of Harbin Engineering University. We had taken almost 1 year for preparation such as inviting many professors and researchers around the world to organize the international editorial board for IJNS as well as developing the Web-based journal system. The actual publication of the IJNS was started in 2010 by Hidekazu Yoshikawa as Editor-in-Chief and Zhijian Zhang as Vice Editor-in-Chief of IJNS. For details please visit the Web-IJNS site (<http://www.ijnsweb.com/>).

In January 2013, after continuing to publish the IJNS for 3 years, we discussed a plan to publish a new book series to introduce advances in research and development of nuclear safety for the sustainable development of nuclear power aimed at the symbiosis of humans, society, and the environment. Our plan was to publish one book per year, with the topic of each book of this series based on selecting excellent papers from the IJNS to deal with contemporary subjects on the progress of nuclear safety for symbiosis and sustainability.

Now, how were the topic and the papers selected for the first book of this book series?

The period of 2010–2012, when the IJNS had entered the business, was a time when world opinion about nuclear power had changed drastically from a positive wind to a negative one because of the severe accident that occurred at the Tokyo Electric Power Company's Fukushima Daiichi nuclear power station in Japan in March 2011. This Fukushima Daiichi accident affected nuclear development policy not only in Japan but also in many nuclear-developing countries around the world. It also affected the direction of the publication of IJNS in many ways, but that is not a matter to be dealt with here.

What we will introduce here are the topics and percentages of all the technical papers included in the IJNS in the 3 years from 2010 to 2012, shown in the table below. The total number of research papers and technical reports is ca. 100, where the articles introducing the world trends in nuclear power development and those reports about the social trends in Japan after the Fukushima Daiichi accident are excluded.

No.	Topic	Percentage
1	Plant operation and maintenance	16.5
2	Instrumentation and control	5.2
3	System safety analysis	20.6
4	Software verification and validation	5.2
5	Heat transfer and thermal hydraulics	11.3
6	Organizational and social factors	5.2
7	Human-machine interface	14.4
8	Nuclear fuel cycle and back-end issues	6.2
9	Reactor physics and nuclear fuels	4.1
10	Virtual and augmented reality	11.3

Making comparisons with the general academic journals in nuclear science and technology, it can be seen that the low ratios of nos. 5, 8, and 9 and the high ratios of 4, 7, and 10 exhibit specific characters of the IJNS. This may be ascribed to the high ratios of editorial members who specialize in the areas of nuclear instrumentation and control (I&C) and human-machine interface technologies (HMIT). Hence, based on this specific character of IJNS, the first book of our series publication was organized by selecting 32 excellent papers in areas 1, 2, 3, 4, 7, and 10 in the above table and arranging them into the five parts of (i) full digital I&C and HMIT, (ii) risk monitor methods for large and complex plants, (iii) condition monitoring for plant components, (iv) virtual and augmented reality for nuclear power plants, and (v) software reliability verification and validation (V&V) for nuclear power plants.

As a result, this first book on the progress of nuclear safety for symbiosis and sustainability becomes a unique volume to introduce the advanced methods of instrumentation, control, and information presentation systems for nuclear power plants by the positive application of the rapid progress of information and communications technology with respect to design and implementation to maintain and upgrade the safety operation of nuclear power plants. We especially recommend this book for Ph.D. students, researchers, and engineers in nuclear power engineering, particularly to understand the knowledge on software technologies of I&C and HMIT in advanced light water reactor plants in the twenty-first century.

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