

A Happy New Year . . .



Professor Koji Okamoto

It is my pleasure to celebrate the fifth anniversary of the ASME Journal of Nuclear Engineering and Radiation Science (NERS), as a former chair of Division of Power and Energy Systems (PES), Japan Society of Mechanical Engineers (JSME). The NERS is a very important journal for nuclear researchers and engineers.

ASME NED (Nuclear Engineering Division) and JSME PES have strong collaboration in the promotion on Nuclear Engineering and Radiation Science.

In the 1980s, the collaborative activity between ASME and JSME founded the International Conference on Nuclear Engineering (ICONE). The first ICONE had been held in Tokyo in 1991. Then, the second ICONE was in San Francisco. ICONE is now annually held with the 26th ICONE in London, last year.

When ICONE was founded in 1991, Nuclear Energy in the U.S. and Japan had two directional strong winds. One is nuclear energy promotion for huge electricity demands for both countries. At 10 years after Three Mile Island Accident, the nuclear industries in the U.S. got positive feedback for safety and economy. Applying the Probabilistic Risk Assessment to the Nuclear Plant Operation and Maintenance, both safety and economy had huge progress, i.e., the safer the nuclear plant is, the more financial advantage is obtained. ASME developed lots of the important standards on nuclear engineering, resulting in safer and economical nuclear power plants. Another wind is antinuclear activities after Chernobyl accident. Although against the wind, Japan continuously constructed the new nuclear plants in the 1990s. Also, advanced nuclear systems, such as ABWR, APWR, AP1000, and so on, had been developed. ABWR had been constructed in 1996 at Japan, and AP1000 and EPR in 2018 at China.

ICONE has supported nuclear promotional activities for around 30 years. Currently, ICONE is organized by ASME, JSME, and Chinese Nuclear Society (CNS). The safe nuclear system will save the world, in viewpoints of environment, efficiency, and economy. World electricity demands increased continuously and drastically, in the 2010s. Safe nuclear system is now strongly needed around the world.

After the Fukushima accident in 2011, Japan was in very bad conditions for Nuclear. Only 12 pressurized water reactor (PWR) plants and 3 boiling water reactor (BWR) plants were approved for restart by the new regulation in Japan. Some of them need additional system construction or additional local governmental approval. So they need several years for restart. Currently, only nine PWR plants are in operation. Over 5 PWR plants and 16 BWR plants are under long-long evaluation by Japanese

Regulatory Board or preparation for application. Five BWR plants are considering the decommissioning without restart, because of the financial and political reason. Also, seven PWR plants, two BWR plants, and one fast breeder reactor (FBR) plant were decided the decommissioning after Fukushima accident. Two BWR plants, one advanced thermal reactor (ATR) plant, and one gas cooled reactor (GCR) plant were already in the decommissioning stage in 2011. Thus, 14 plants are in the decommissioning stage now. Maybe, a total of 21 plants will be in the decommissioning stage in a couple years. Nuclear industries and nuclear regulatory body have lost the trust and support of the Japanese people, because of Fukushima accident. Then, the regulatory body had to evaluate the post-Fukushima nuclear systems, politically, not technically. This is great regret that the nontechnical issues were mainly discussed at the regulatory meeting. Nuclear systems are very complicated systems, so oversight evaluation on safety is the worldwide standards. However, Japanese regulatory body just evaluates certain topics, including earthquake, Tsunami, Tornado, and so on. The utilities just follow the regulatory body's suggestions, because they would like to re-start the plants. Thus, the evaluation is mainly carried out without considering the engineering viewpoints.

Before Fukushima accident, Japan had 54 plants. Now, only nine plants (less than 20%) are operating. Eighteen plants (around 30%) are waiting for the approval by the Regulatory body. Twenty-one plants plus six Fukushima-Daiichi plants will be in decommission (50%). Fukushima Accident forced up to half of the Japanese Nuclear Energy to be decommissioned. Therefore, nuclear accident should never happen again.

Although against the wind for nuclear industries, a lot of new research and development (R&D) had been started in the 2010s. For example, Fukushima-Daiichi Nuclear Power Plant Decommissioning has too many R&D topics, including Robotics, Material Science, Thermal-hydraulics, Waste Management, Risk Evaluation, Severe Accident, and so on. The systematical viewpoints are very important for these R&D topics. Because of the complicated Fukushima site decommissioning activities, one research affects too many of the other researches nonlinearly. This is engineering, i.e., our areas of ASME, JSME, and CNS. Systems' view is strongly required for this R&D. Also, post-Fukushima Safety improvement is strongly requested by world stakeholders. Understanding the Severe Accidents and Environmental affection, the Fukushima Accident never happens again. Many international collaborations started to improve the Nuclear Systems, including advanced light water reactor, small modular reactor, and fuel cycle. Collaboration between ASME, JSME, and CNS will be the key for nuclear future.

This year, 2019, JSME, ASME, and CNS will organize the 27th ICONE to be held at Tsukuba, Japan, on May 19–24.¹ The

¹<http://icone27.org>

conference message shows that “Nuclear power saves the world.” State-of-the-art R&D will be discussed in Tsukuba. Coming 2020s, a new nuclear era will start. Many nuclear plants will start operation in China, India, and so on. Also, two AP1000 and two ABWR will start operation in the U.S. and Japan, respectively.

The journal of NERS will grow to be a top world nuclear journal. JSME PES will continuously support the development of

nuclear research areas for a sustainable world, collaborating with ASME NED.

Professor Koji Okamoto
2017 Chair of JSME PES
The University of Tokyo,
Tokyo 113-8656, Japan