



# Guest Editorial

## Special Issue: Current Trends for Pressure Vessels and Piping Technology

There have been significant innovations in Pressure Vessels and Piping (PVP) technology over the last decade. In Europe and North America, inspection and evaluation methods using risk-based and performance-based ideas have been established. Moreover, the integrity evaluation methods for the plant components based on the probabilistic approach and the reliability method have been applied to the field already. In addition, the experience of the earthquake disaster of Japan in 2011 has increased the demand for developing more precise and accurate evaluation methods for the components beyond-design-basis conditions. For example, nonlinear analysis methods and strain-based criterion have been introduced to some design and construction codes. Based on this background, the Guest Editors, Akira Maekawa, Kiminobu Hojo, and Marwan Hassan, have published a special issue, entitled “Current Trends for PVP Technology” in the ASME Journal of Pressure Vessel Technology (JPVT). The aim of this special issue is to provide an overview of the latest findings in the areas related to pressure vessels and piping technologies. This special issue assembles high-quality, original research that focuses on the following topics.

### Developments in Codes and Standards

Topics related to the technical basis of the recently published codes and standards are provided. A wide range of topics is covered, such as vessel design, seismic design, and in-service inspection in fast reactors. It is worth noting that evaluation methods using probabilistic fracture mechanics, system-based concepts, and strain-based approaches are standardized. This issue also provides a comparative review on the various codes and standards for an expansion bellow design.

### Recent Advances in Seismic Technology

The challenges to developing a seismic design for a beyond-design-basis earthquake event have been conducted in various countries. This issue provides some of the research results. Topics such as strain-based design approaches, risk-based assessment methods, and metamaterial-based isolation techniques suggest the future directions of seismic technology. As well, subjects such as a benchmark analysis of the elastic–plastic response analysis for pipe elbows, a strength evaluation of a buried pipeline installed across a fault, a numerical study on the categorization of seismic

loading, and a crack growth evaluation method under large seismic loading are of interest.

### Current Fracture Evaluation Methodology

For PVP fracture evaluation, fracture mechanics is an important area of research. This issue addresses remarkable topics, such as a proposal for evaluation methods based on probabilistic fracture mechanics, an estimation of the stress intensity factor for cracking with a larger aspect ratio, and a review of the Z-factor applied to cast austenitic steel pipes. As well, it includes an investigation on the ductility loss of chlorinated polyvinyl chloride plastic pipes.

### Technical Trends for Fluid–Structure Interaction

Fluid–structure interaction in PVP components is the result of the transfer of momentum and forces between the PVP components and the fluid (internal or external). This interaction may be caused by rapid changes in flow and pressure or it may be initiated by the mechanical action of the PVP components. The resulting loads and pressures can induce unacceptable vibrations and can lead to the components being compromised. This is an active area of research, which has received increased attention because of safety and reliability concerns in power generation stations, and environmental issues associated with pipeline delivery systems, to name just a few issues. This special publication includes topics associated with fluid-induced vibrations, water hammers, and pressure pulsations.

### Other Topics

This special issue has also received many contributions from the fields of Design and Analysis as well as Materials and Fabrication. Some of this research deals with novel data and valuable examinations. This wide range of topics includes a design review on pipe elements, analysis model of expandable tubular pipe, and thermal characteristics of pipe flange joints. These topics will be useful for the future of PVP design. Unique research works related to the elastic–plastic behavior of pressure vessels with piezoelectric layers is included in this issue.

The Guest Editors of this special issue would like to express their sincere appreciation to all the authors for their valuable contributions to present the current trends for various PVP technologies. Furthermore, they would like to express their gratitude to the Chief Editor, Professor Young Kwon, for having promoted this special issue.



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