

# Development of Phenomena Identification and Ranking Table (PIRT) of Thermal-Hydraulic Phenomena for SMART100-DECs to Implement T-H Model and Validation Items in SPACE

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The Phenomena Identification and Ranking Table (PIRT) of Thermal –Hydraulic (T-H) phenomena is used to identify the key phenomena associated with the intended application, then rank the relative importance and current state of knowledge for each identified phenomenon by the experts in the related field. This ranking provides guidance for code development and improvement for the specific simulation of the plant behaviors.

The Safety and Performance Analysis Code for nuclear power plants (SPACE) has been developed for the safety analysis of operating PWRs and the design of advanced water reactors. The SPACE adopts advanced physical modeling of two-phase flows, mainly two-fluid three-field models that consist of gas, continuous liquid, and droplet fields. Based on that the Nuclear Safety and Security Commission (NSSC) approved the use of the SPACE for licensing applications of Korean PWRs in 2017. In addition, the SPACE has been improved continuously to extend its application for the Design Extension Conditions (DECs).

SMART100 is System Integrated Modular Advanced Reactor with 100 MWe and fully Passive Safety Systems (PSSs). The design of SMART100 was upgraded from the standard design of SMART and developed by Korean Atomic Energy Institute (KAERI). Unlike loop-type commercial reactors, the SMART100 plan adopts a helically coiled steam generator, and internal pressurizer inside the Reactor Pressure Vessel (RPV).

**The main objectives of this paper are to develop and generate PIRT of important T-H phenomena for expected DECs of SMART100, and to implement T-H models and validation items in SPACE for the reference reactor and scenarios.**

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