

## Abstract

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# Thermal Hydraulic Performance Analysis of a Small Integral Pressurized Water Reactor Core

by  
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A thermal hydraulic analysis of the International Reactor Innovative and Secure (IRIS) core has been performed. Thermal margins for steady state and a selection of Loss Of Flow Accidents have been assessed using three methodologies to account for uncertainty. The thermal hydraulic analysis has shown that the IRIS is designed with adequate thermal margin for steady state operation, the locked rotor/shaft shear accident (LR/SS) and for variants of the partial loss of flow accident. To treat uncertainties, three methods were used, ranging from conservative, deterministic methods, to more realistic and computationally demanding Monte Carlo-based methods.

To facilitate the computational requirements of the thermal hydraulic analysis, a script-based interface was created for VIPRE. This scripted interface (written in Matlab) supplants the existing file-based interface. This interface allows for repeated, automatic execution of the VIPRE code on a script-modifiable input data, and parses and stores output data to disk. This endows the analyst with much greater power to use VIPRE in parametric studies, or using the Monte Carlo-based uncertainty analysis methodology. The Matlab environment also provides powerful visualization capability that greatly eases the task of data analysis.

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