



RIC 2011 TRACE-PARCS Development and Application Status

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What is TRACE-PARCS?

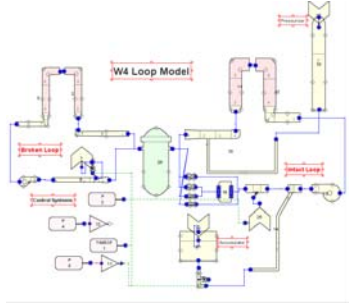
- The TRAC-RELAP Advanced Computational Engine (TRACE) is NRC's flagship thermal hydraulics reactor systems code
 - TRACE models 2-phase (water and steam) flow in reactor systems: flow and heat transfer in pipes, pumps, vessels, and other components
 - As a systems code, TRACE uses experimentally determined correlations to determine its results
 - TRACE calculates a best-estimate for a large range of thermal hydraulics parameters, such as pressures, temperatures, flow rates, and void fractions
 - Can model 1D and 3D geometries
- The Purdue Advanced Reactor Core Simulator (PARCS) provides 3D neutronics and kinetics response



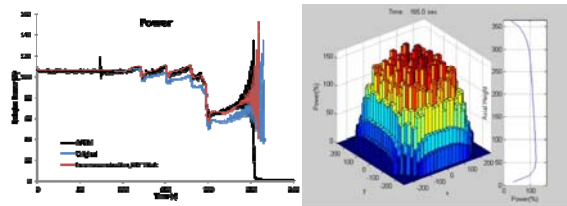
What is TRACE-PARCS used for?

- Generation of independent confirmatory analysis of licensee submittals
- Ensure that submittals are reasonable and capture important phenomena
- Provide insights into sensitivities of designs
- For the existing fleet of reactors, TRACE-PARCS is used in support of Extended Power Uprates (EPU), including the analysis of BWR stability, and transients such as Anticipated Operational Occurrences (AOOs)
- Confirmatory analysis of new reactors
- Support for Generic Safety Issues (GSI)

Typical TRACE Plant Model Nodalization



TRACE-PARCS: Oskarshamn-2 Results



What drives development priorities for TRACE-PARCS?

- Keep pace with industry's modeling efforts in order to ensure the capability to perform confirmatory analysis
- Improve assessment capabilities for new reactor features and components
- Broaden assessment set for PARCS
- Ensure the codes can provide EPU support
- Improve code speed and stability
- Fix any bugs that may be discovered



What is the Current Status of TRACE Plant Models?

- Models have been built for most major reactor types in the current operating US fleet.
- Additionally, models have been or are being created to assist in design certification review support for:
 - EPR
 - US-APWR
 - ABWR
 - ESBWR
 - AP1000
 - NUSCALE
 - mPower



Summary

- TRACE-PARCS provides the NRC with a capable systems analysis code for confirmatory analysis
- TRACE-PARCS has many uses within the NRC all of which help the NRC meet its nuclear safety mission
- TRACE-PARCS development is on-going
- Plant model development continues in response to Agency needs
