



Computer Codes and Applications in the Regulatory Process

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Purpose of Code Application

- Confirmation of Submittals
 - Are licensee/applicant analyses reasonable?
 - Have submittals captured the phenomena?
- Exploratory
 - Are there any hidden “cliffs” that have not been discovered?
- Resolution of Generic Issues



Fluid Code Types

- DNS – Direct Numerical Simulation
 - Micro scale, only practical for low Re
- LES – Large Eddy Simulation
 - Direct solution for large scale, models smallest scale
- CFD – Computational Fluid Dynamics
 - Local and component scale
 - Turbulence models for closure
- System Codes – TRACE, RELAP5
 - Reliance on models and correlations

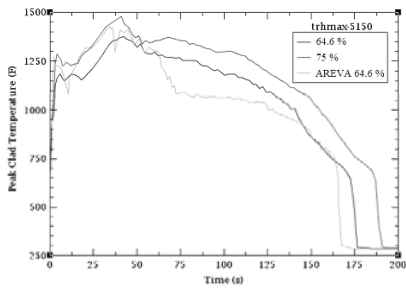


Codes Used for Regulation

- System Level – TRACE and RELAP5
- Containment and Severe Accident – MELCOR
- Component Level - FLUENT

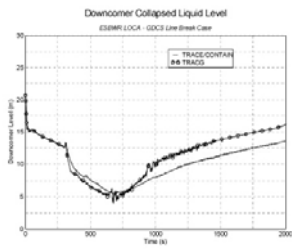


TRACE EPR Results - LBLOCA



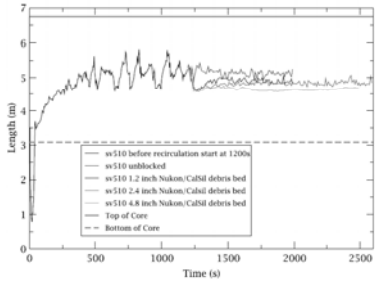


TRACE ESBWR Results - LBLOCA



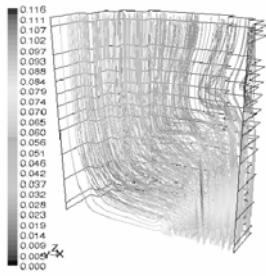


TRACE – GSI-191 Core Blockage





FLUENT – GSI-191 Core Blockage



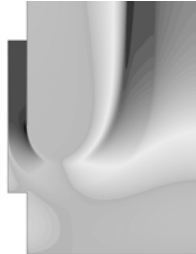


FLUENT – ESBWR Contours of Stream Functions



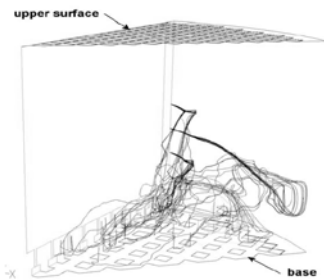


FLUENT – ESBWR Contours of Axial Velocity



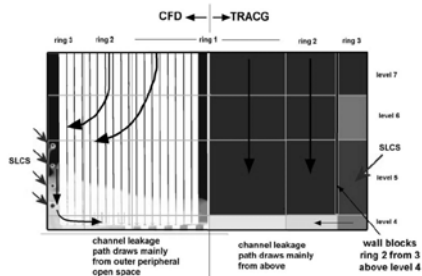


FLUENT ESBWR – Boron Injection





FLUENT ESBWR – Boron Injection





Regulatory Applications of Codes

- Systems codes have assisted in confirming behavior of licensee/applicant submittals
- System codes have assisted in exploring generic issues and their resolution
- CFD codes have given valuable insights into component-level behavior