RELAP5-3D Version 4.2.1
Developmental Assessment

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Overview

• Background
• Reports
• Results
There are 54 developmental assessment cases

- 18 phenomenological cases
- 27 separate effects test cases
- 9 integral effects test cases
Three reports are prepared

• Volume III of the RELAP5-3D code manual
  – IRUG released Linux executable version
  – Semi- and nearly-implicit calculations
• Comparison report #1
  – New and previous Linux versions of the code
  – Semi-implicit calculations only
• Comparison report #2
  – Linux and Windows versions of the new code
  – Semi-implicit calculations only
• All three reports provided with the code transmittal
Volume III summary

• No new cases

• Two changes in assessment judgments
  – LOFT L2-5 1-D broken loop cold leg density from minimal to reasonable
  – LOFT L2-5 3-D broken loop cold leg mass flow from reasonable to excellent

• Still have problems with nearly-implicit modeling of the multi-dimensional component
  – LOFT L2-5 3-D and water-over-steam 3-D cases both failed to run to completion
Code comparison reports

• Differences in calculations based on visual comparison of plots
• Three categories
  – No difference
  – Noticeable difference – curves different, but not so much that the assessment judgment would be expected to change
  – Significant difference – curves different enough that the assessment judgment might change
Noticeable difference example

Data uncertainty: ±10.3 K
Noticeable difference example
Significant difference example
Comparison of versions 4.2.1 and 4.1.3

- No significant differences
- 139 noticeable differences in 13 assessment cases
  - 6 in phenomenological cases
  - 34 in separate effects cases
  - 99 in integral assessment cases
- Likely causes
  - Default coding change to prevent any Courant limit violations in semi-implicit calculations
  - Three integral cases changed to run new steady state calculations before the transient
Linux-Windows comparison for version 4.2.1

- Three significant differences, all in integral effects cases
- 118 noticeable differences
  - 8 in phenomenological cases
  - 21 in separate effects cases
  - 89 in integral effects cases
ROSA-IV intact loop cold leg density

![Graph of ROSA-IV intact loop cold leg density](image)
LOBI heater rod temperature at Level 5
LOFT L2-5 1-D intact loop cold leg density
Summary

• No significant changes in response between versions 4.1.3 and 4.2.1
• Two assessment judgments changed, more from a re-evaluation of the calculations than changes in the code performance
• Mostly minor differences between the Linux and Windows versions of 4.2.1 for the developmental assessment cases