

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

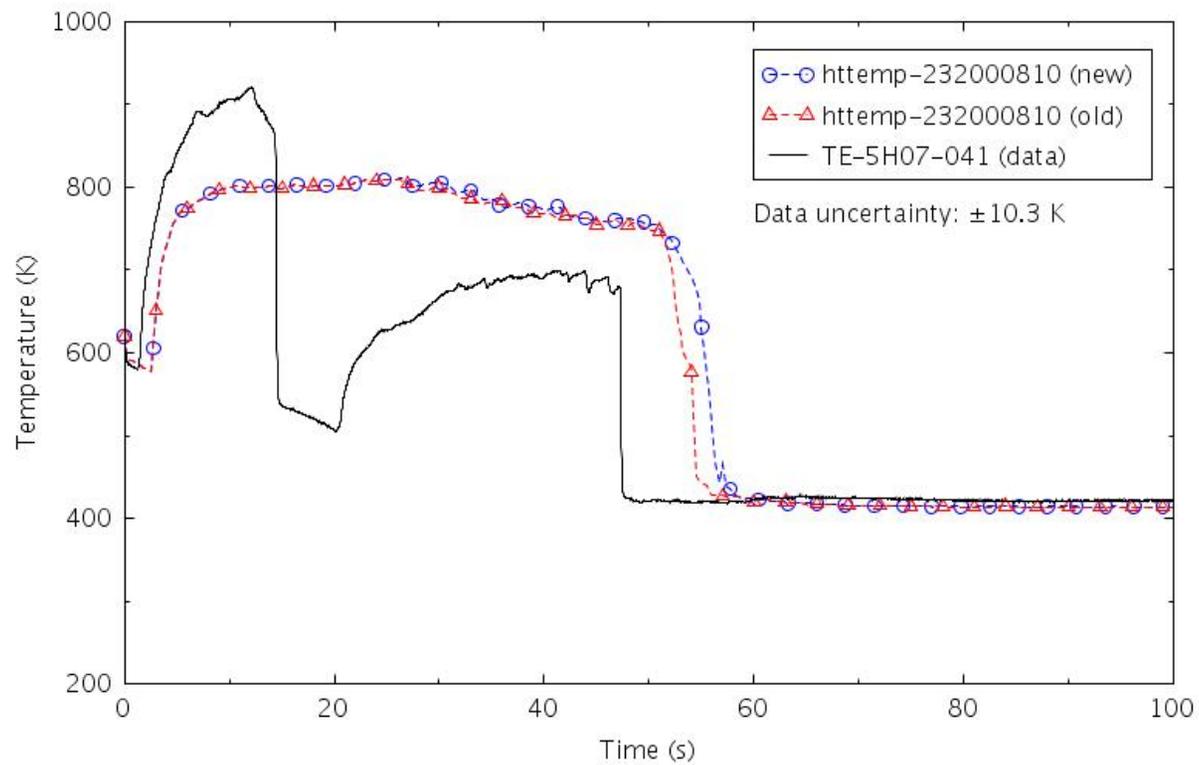
Volume III summary

- 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

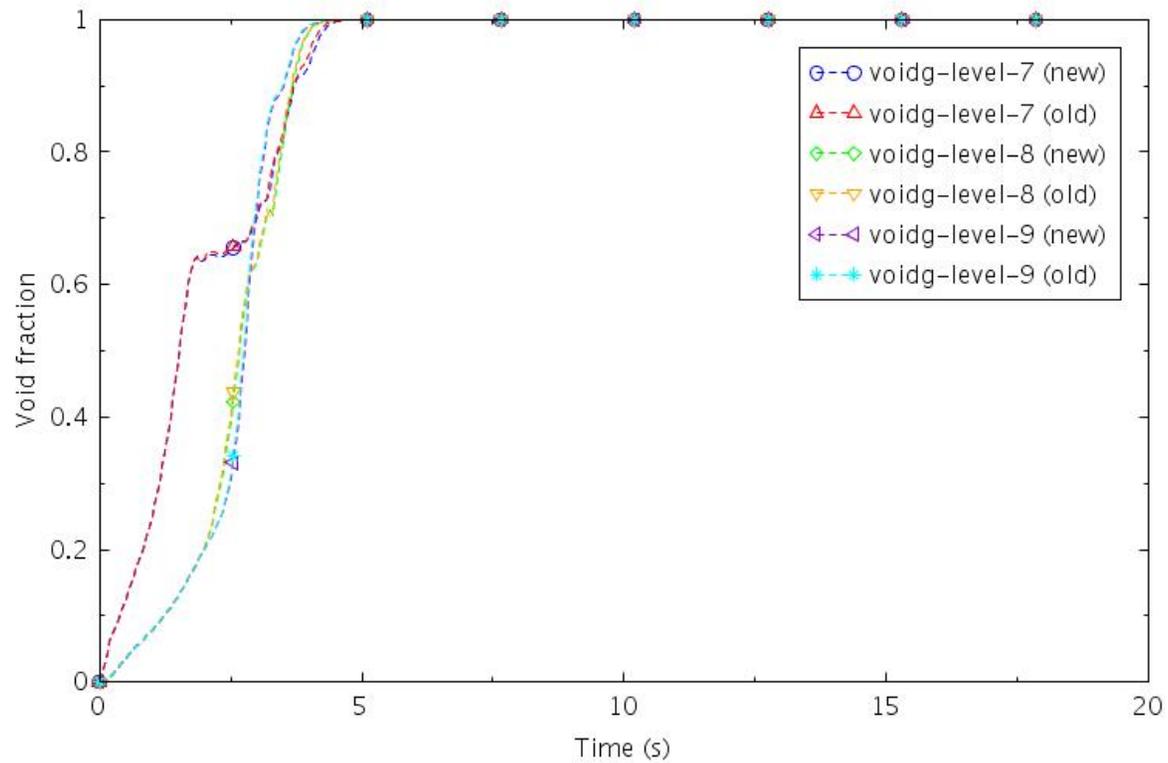
Code comparison reports

- 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

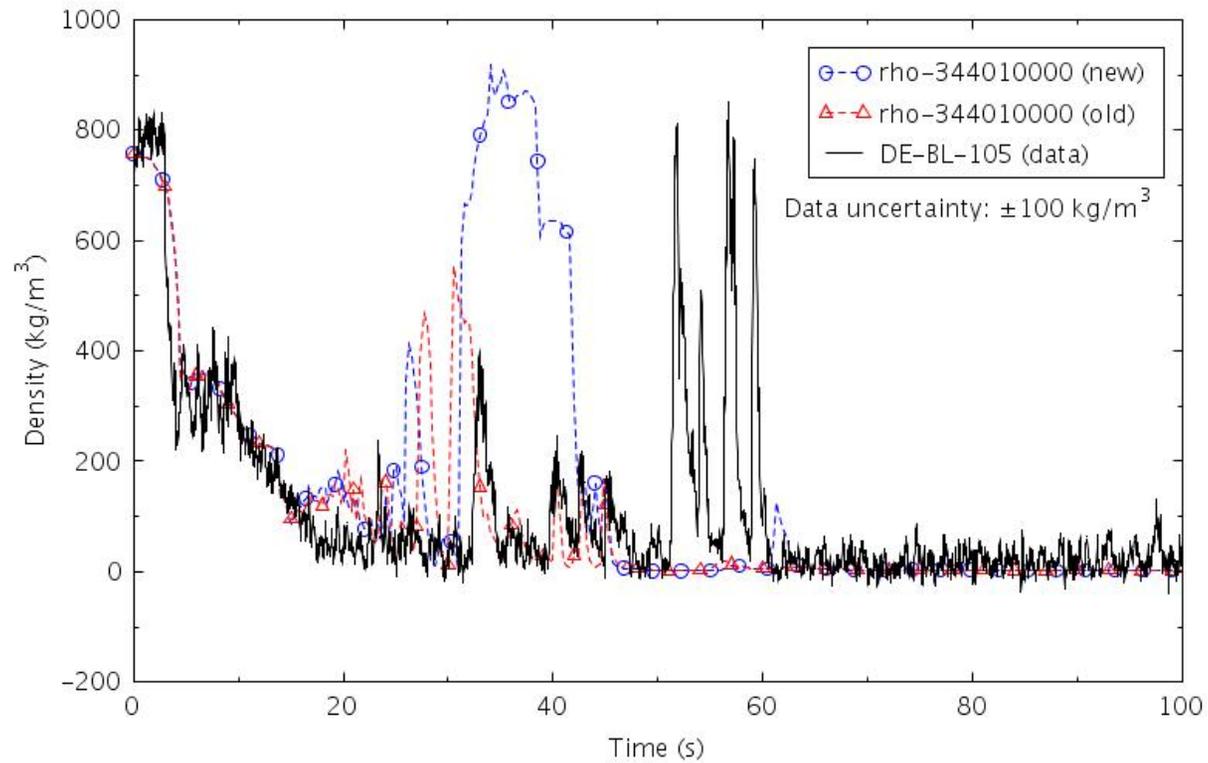
Noticeable difference example



Noticeable difference example



Significant difference example



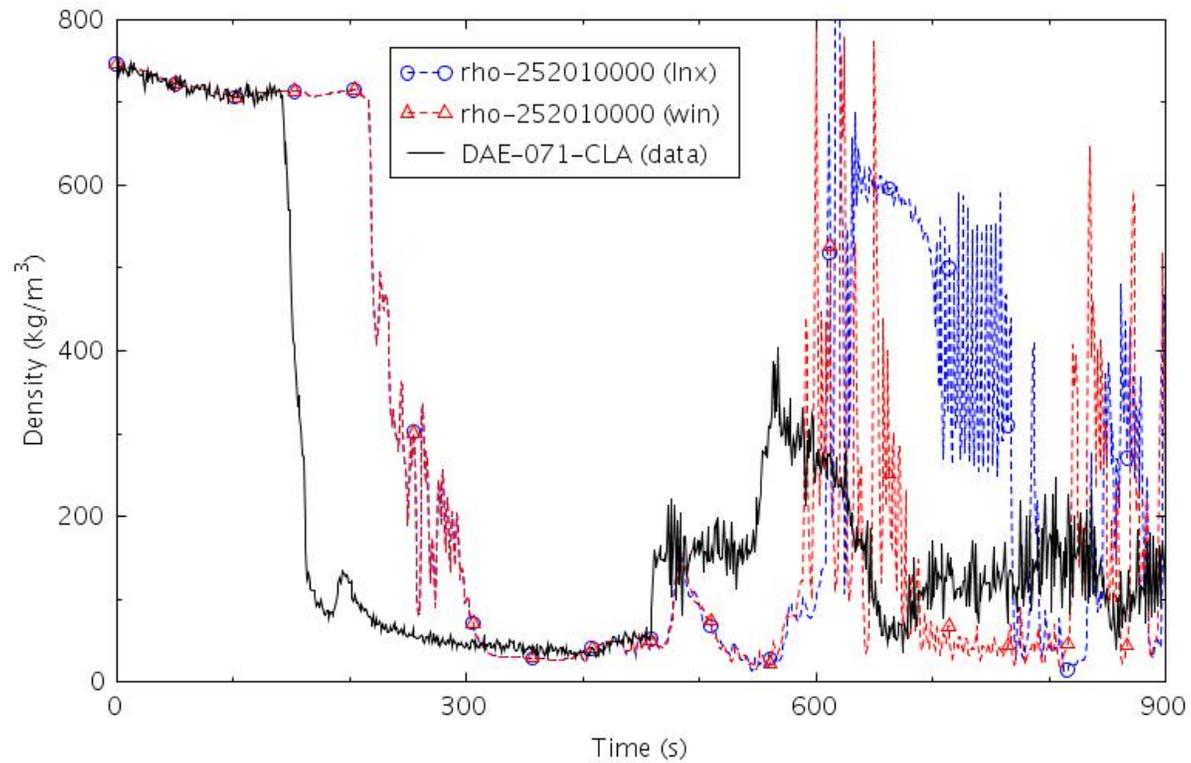
Comparison of versions 4.2.1 and 4.1.3

- 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

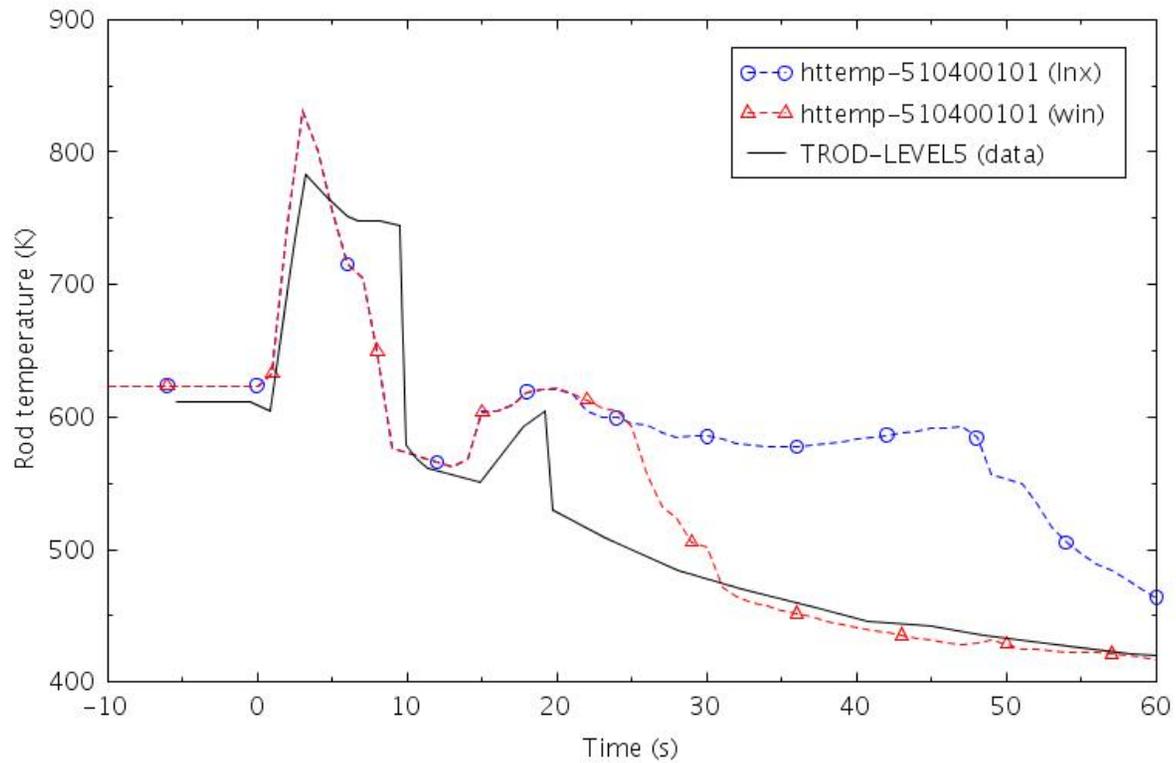
Linux-Windows comparison for version 4.2.1

- 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

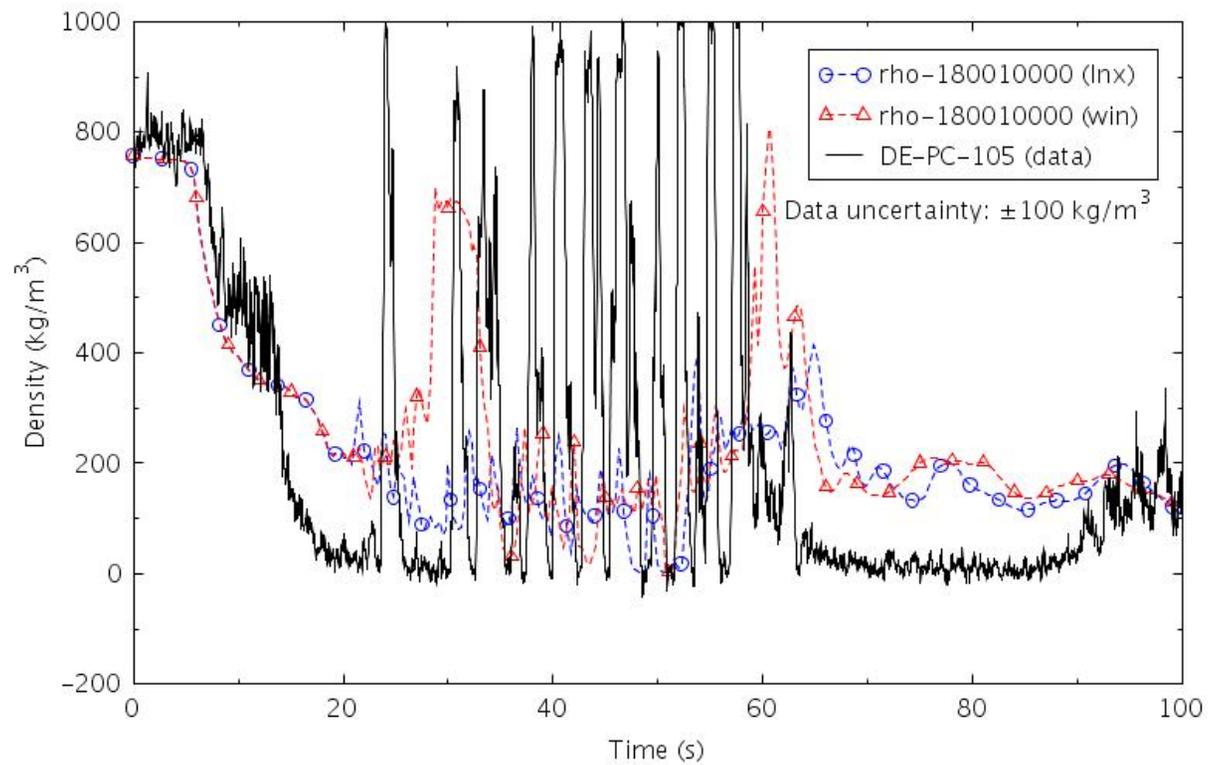
ROSA-IV intact loop cold leg density



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