Improvements to the RELAP5-3D Radiation/Conduction Enclosure Model

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Outline

- *Background*

- *Improvements to radiation/conduction enclosure model*

- *Summary*

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Background

- **Radiation model view factors required in restart input deck**

- **Initialization of heat structure ignores radiation/conduction enclosure heat flux**

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Improvements to Radiation Model

- *User input view factors saved in restart/plot file*

- *Heat structure initialization iterates between conduction initialization and radiation/conduction enclosure initialization until surface temperatures converge – initialization with radiation/conduction enclosure model takes longer*

Test Cases

- *Existing radiation test case – gota27, tests radiation model*

- *Conduction enclosure test case – enclss, enclssr, exercises conduction enclosure model and restart*

- *Combined radiation/conduction test case – vhtrprism, combined convection, radiation, and conduction enclosure test case*

Test Results (cont)

- *Two test runs for gota27 and enclss test cases – once with code before improvements and one after modification*

- *Test run with unmodified code was null transient to get converged steady state solution*

- *Test run with modified code was input check with new initialization*

- *Surface temperatures and radiation/conduction surface heat fluxes identical to engineering significance – can't be identical because of iterative nature of solution*

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Summary

- **Radiation /conduction enclosure restart deficiency corrected**

- **Initialization of heat structures improved**

- **Test results verify that radiation/conduction enclosure improvements implemented correctly and producing expected results**

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