RELAP5-3D Development & Application Status

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Outline

- ***Changes in Version 2.3***
- ***Ongoing and future work***
- ***Current applications at the INL***

Version 2.3 Released May 2005

New models and improvements to existing models

- *Pressurizer spray model*
- *Feedwater heater model*
- *Improved steady-state mode*
- *Hex Krylov kinetics solver*
- *Multiple system coupling*
- *Radiological transport model*

New 2.3 Models or Improvements

- ***ATHENA Models Added***
  - *New coolants: Ammonia, Carbon Dioxide, Glycerin, Helium, Hydrogen, Lead-Bismuth, Lithium, Lithium-Lead, NaK, Nitrogen, Potassium, Sodium*
- ***BPLU Default Solver***
- ***Pump Model Inputs***
  - *Exponents for the pump friction torque model and the lower limit for the friction torque*
- ***Minor Edit/Plot Variables***
  - *metal-water reaction and counter-current flooding models*

Recently Completed

- ***Compressor Model***
- ***Critical Flow Time-Step Sensitivity***
- ***Henry-Fauske Critical Flow Junction Flag***
- ***Coupling Programmer's Manuals***
- ***HeXe Coolant Properties***

Ongoing Development

- ***Ransom-Trapp Critical Flow Model***
  - *Re-program as originally formulated*
- ***Research Heat Transfer and Pressure Drop for Low Prandtl Number Gases***
- ***FORTRAN 90 Conversion***
- ***Code Restructuring***
- ***Code Merger Plan***

"Planned" Work

- ***Heat Transfer/Fluid Model Coupling***
  - *Mitigate the need for fine nodalization to capture temperature gradients in low heat capacity coolants*
- ***Heat Pipe Model***
- ***Begin Code Merger***

Current Applications at INL

- ***Next Generation Nuclear Plant***
  - *Very High Temperature Reactor*
  - *Advanced High Temperature Reactor*
  - *Gas Cooled Fast Reactor*
  - *Supercritical Water Reactor*
- ***MAPLE Production Reactor***
- ***ATR Gas Loop***
- ***HTTR RCCS (Validation)***

Summary

- ***New modeling capabilities added***
- ***Modernization underway***
  - ***FORTRAN 90***
  - ***Restructuring***
- ***Scope of applications expanding***
  - ***Generation IV reactor designs***
  - ***Space reactor modeling***
- ***Code merger brings NRC-funded improvements***