FHR Benchmarking Workshop 2

Additional Concerns

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Overview

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8. Liquid-Fuel Reactor Phenomena
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Session Purpose

What are significant concerns for FHR TH development that haven't been addressed within the previous sessions?

Fundamental phenomena and methodologies important for overall development not already captured?

Similitude: Coolants

Simulant fluids may be an important research tool for FHR TH understanding and development.

What requirements are needed to establish simulant fluids for molten salts, particularly in the eyes of licensing agencies (ex. NRC)?

What are the restrictions on using simulant fluids in experiments? What TH experiments must be done with the prototypical fluid (flibe)?

Similitude: Structural Materials

Simulant materials (solids) may be an important research tool for FHR conjugate heat transfer understanding and development.

What requirements are needed to establish simulants in general for molten salts, particularly in the eyes of licensing agencies (ex. NRC)?

What are the restrictions on using simulants in experiments? What TH experiments must be done with the prototypical fluid (flibe)?

What SETs would be useful here, and how can results be integrated in IETs?

Verification, Validation, and Uncertainty Quantification

VVUQ is the fundamental process of benchmarking.

Do we have a uniform methodology between IRP members? Between working groups? What are industry best practices?

What requirements are needed to establish the success of VVUQ, particularly in the eyes of licensing agencies (ex. NRC)?

What role do PIRTs play?

Conjugate Heat Transfer

Conjugate heat transfer is the coupled heat transfer between solids and fluids in the system; this will be important in understanding the interaction between flibe and the reactor's structural components, particularly during accident transients.

What are the best experiments and modeling tools to build our understanding of this area in FHRs?

How will phase change (boiling of flibe or melting of steels) be important? How can we improve our understanding here?

Radiation Heat Transfer

Important at high temperatures, particularly those in accident transients. Relatively poorly characterized for molten salts (spectral absorptivity in particular)…

What experiments and modeling tools can be used to improve our understanding of this area in FHRs? SETs?

How important will this be for design and licensing?

How can better data for spectral absorptivity coefficients be obtained?

Computation Fluid Dynamics

A very powerful tool for understanding flow within structures, particularly to capture 3D effects/phenomena.

What components or phenomena must be modeled using CFD?

Where can CFD be used to aid in optimization of components and structures?

Liquid-Fuel Reactors TH Phenomena

A long-term goal generally is the development of fluid-fueled reactors (TMSR-LF, MCFR, MSR, etc.).

How can our research set the stage for this development and transition? What are common understanding/development milestones?

How can we tap the same resources as this community to expedite research and development?

How can we help each other?

Others?

Thank you for your attention!