Design of a PID Controller for a Molten Salt Microreactor

Master's Plan

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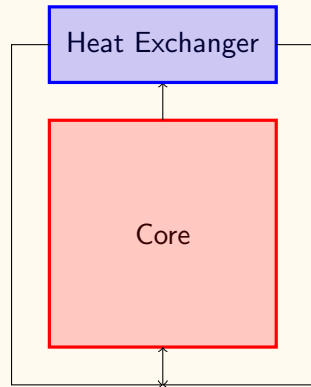[2]Department of Electrical and Computer Engineering

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Outline

Scope

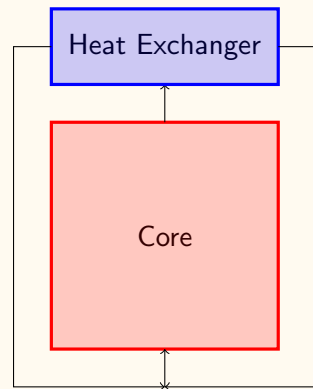# Molten Salt Nuclear Battery (MSNB)

- Self-Contained liquid fueled molten salt micro-reactor

Simplified schematic drawing of an MSNB

Molten Salt Nuclear Battery (MSNB)

- Self-Contained liquid fueled molten salt micro-reactor
- 1 MW design using UF_4 dissolved in FLiNaK

Simplified schematic drawing of an MSNB

Molten Salt Nuclear Battery (MSNB)

- Self-Contained liquid fueled molten salt micro-reactor
- 1 MW design using UF_4 dissolved in $FLiNaK$
- Criticality is manipulated using axial control drums
    - Neutron absorber plate covering cylinders of neutron reflector
    - Drums are rotated to point more absorber towards the core to insert negative control reactivity

MsNB Control Drums

Background on MSNB

Neutronics
[**?**]

Thermal Hydraulics
[**?**]

Process Control
Me

[**?**]
[**?**]

Figures from plotter (neutronics paper?), with a focus on control actuation

Applied Literature Review

Passive Feedback

Main Operational Control Problem - Transport Delay

Time-Variance and Non-Linearity

Future Work

Control Drum Characterization

MCNP

Process Simulation

Python

Controller Tuning
MATLAB-Simulink

Implementation and Testing
Python

Timeline

Table: Timeframe for Execution of Project

Tasks	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
Control Drums	X	X	X				
Process Simulation		X	X	X			
Controller Tuning				X	X		
Implementation					X	X	
Cross-Cutting						X	X
Defend							X

Final Remarks

Other Considerations

Discussion

Acknowledgements

References

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