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Project: Critical Heat Flux (CHF) and Post-CHF
Behavior for Accident Tolerant Fuel (ATF) Cladding
Alloys in Light Water Reactors

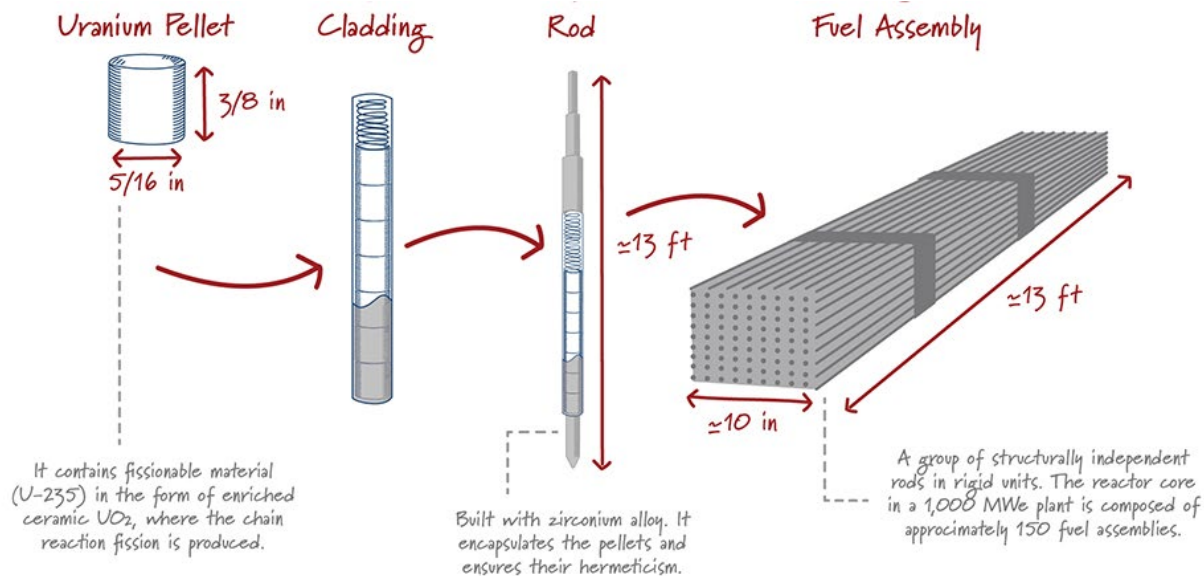
Advisor(s): Prof. Mark Anderson

Sponsor: DOE – Nuclear Energy University Program

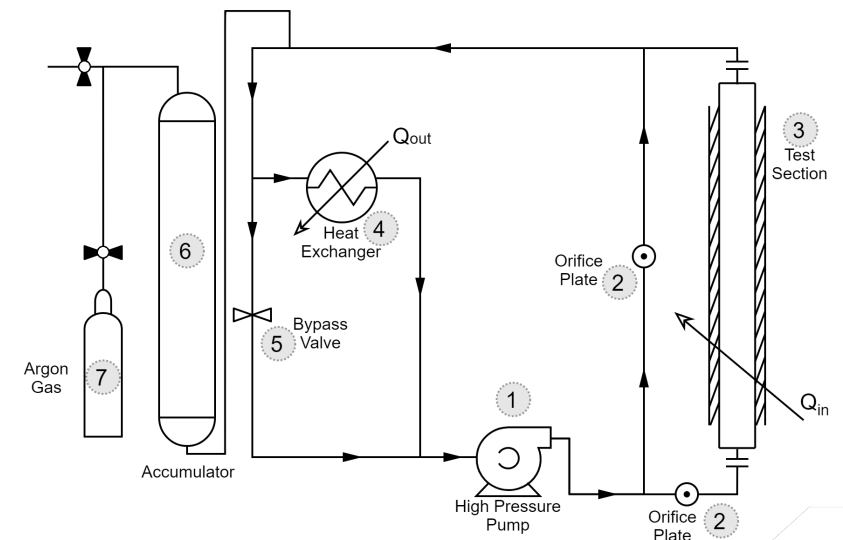


Background

- Accident Tolerant Fuels (ATF) are an area of interest to reactor operators and designers for enhanced safety limits against Critical Heat Flux (CHF) and higher thermal performance.
- Use of optical fibers for the measurement of higher resolution temperature profile both internal to fuel cladding and external within flow regime.



High Pressure Loop



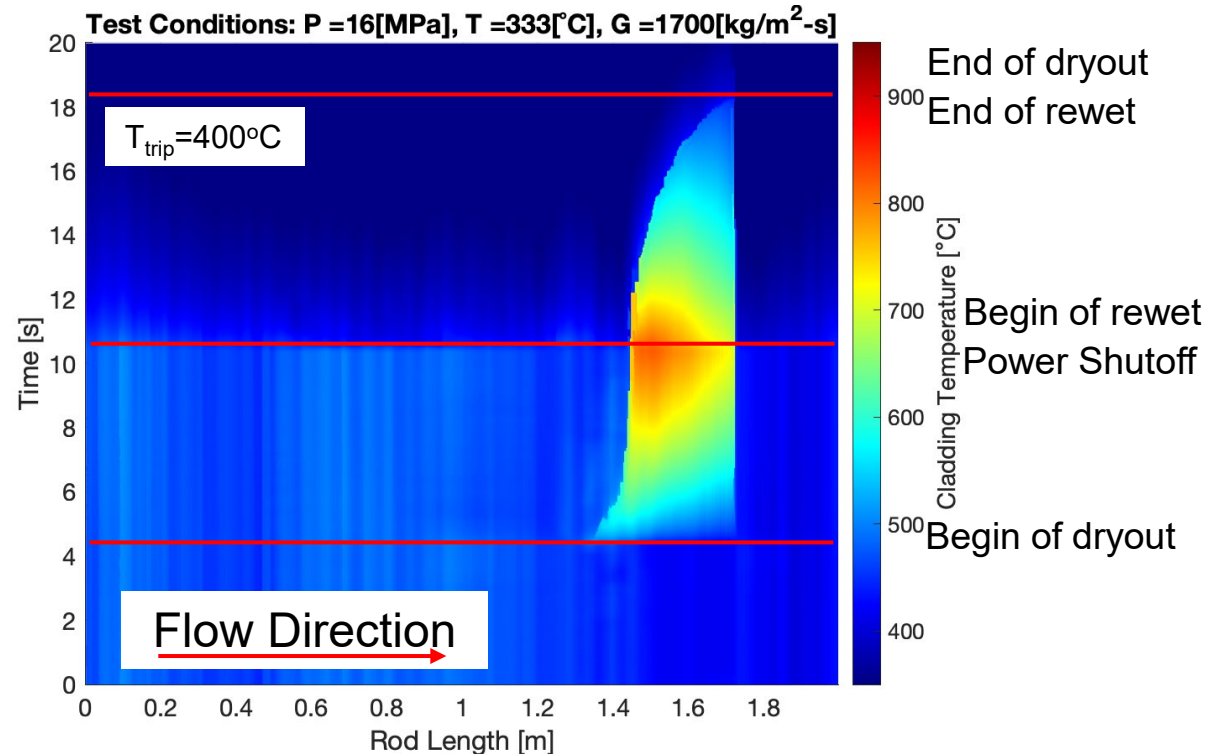
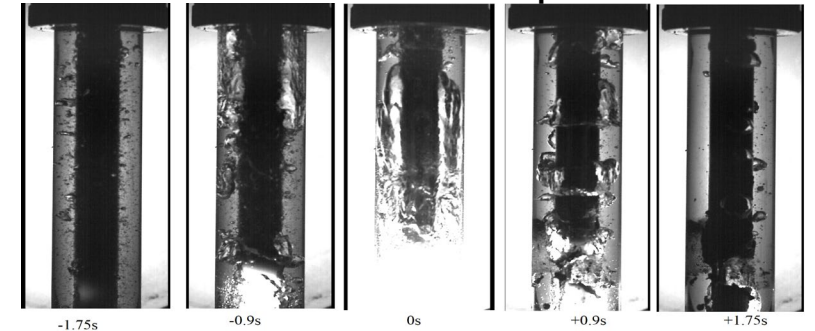


Project Goals

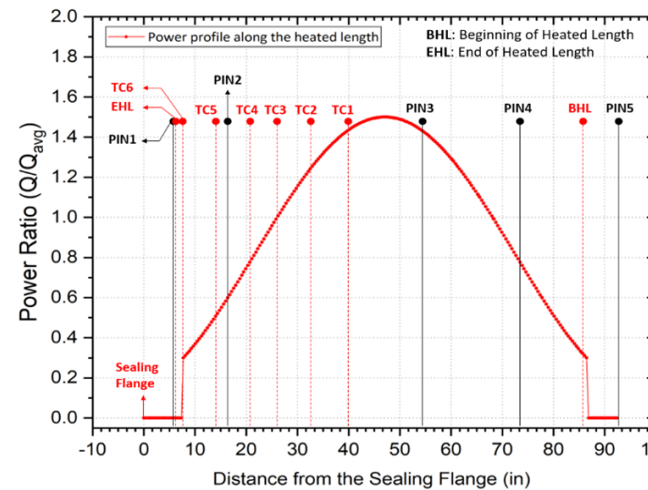
Critical Heat Flux (CHF) under steady-state, transient, and post-accident conditions for nuclear power reactors on ATF cladding candidates:

- Conditions:
 - Turbine Trip scenario in Boiling Water Reactors (BWR)
 - Steady-State Post-CHF in Pressurized Water Reactors (PWR)
 - Loss of Coolant Accident - Reflooding tendencies following Departure from Nucleate Boiling (DNB)
- Candidate ATF cladding materials:
 - Chromium Coated Zircaloy-4
 - APMT Iron-Chromium Aluminum Alloy
 - Silicon-Carbide Composite and Monolithic

CHF occurrence in the Low-Pressure Loop



Heat flux profile in the High Pressure Loop



CHF and Rod Design in Low Pressure Loop

