



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001**

**Grant #** 31310020M0004

**Grantee:** Georgia Institute of Technology

**Title of Grant:** Experimental Investigation of Heat Transfer and Pressure Drop Characteristics of AHTR Channels

**Period of Performance:** 9/25/2020-9/24/2023 (FY2020 Notice of Funding Opportunity NOFO)

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**Executive Summary**

The objective of the proposed work is to develop an experimental dataset, validate, develop as need, and recommend friction factor and heat transfer correlations for the flow channels in the fluoride-salt-cooled Advanced High Temperature Reactor (AHTR). To accomplish this objective, a test section and test facility will be developed to match the channel geometry and relevant dimensionless parameters for the salt coolant. Extensive heat transfer and pressure drop testing will be performed covering laminar, transition, and turbulent flow regimes. The collected data will be used to assess available correlations, develop refined or new correlations based on the underlying phenomena, and recommend the most suitable correlations for the modeling of fluid flow and heat transfer for these fluids and geometries. In addition to the plain channel geometry, a channel with a textured (dimpled) surface, similar to the one proposed in the AHTR preconceptual design will be tested and the enhancement in heat transfer documented and modeled. The recommended correlations will be implemented in TRACE and validated against the experimental data from the proposed work. The dataset and correlations from the proposed work will improve the confidence in the safety estimates obtained from TRACE for the AHTR channel/fluid combination.

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**Presentations and Publications**

*The list of publications was submitted with the final report after grant expiration.*

1. Manuscripts:
  - Heat Transfer and Pressure Drop of a High Prandtl Number Fluid Through a Narrow Channel
  - Heat Transfer Enhancement of Lozenge Shaped Dimple Features for a Narrow Channel

*(These manuscripts are under preparation and will be submitted to pertinent journals when completed).*

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**Patents**

N/A