PURDUE INNOVATES | Office of Technology Commercialization

Optimal Fuel/Core Design for Nuclear Reactors based on Safety and Economics

A numerically validated, AM-manufacturable core design that balances passive heat dissipation with improved operational economics for Gen-IV reactors.

In the design of generation-IV high temperature gas cooled nuclear reactors (HTGRs), a common safety feature is the ability to passively dissipate core heat in the event of a failure. Researchers at Purdue University have developed a method for using safety and economic constraints to optimize core heat dissipation while achieving better operational performance in standard conditions. The research team also validated the feasibility of their optimized core design demonstrating that it can be made using additive manufacturing. This technology has applications in nuclear reactor research and design. With increasing interest surrounding the use of additive manufacturing to create reactor cores, this technology offers a step forward in the safety and economic viability of nuclear power generation.

Advantages

- Improved performance under standard conditions

- Increased cooling ability in the event of failures

- Leverages advances in additive manufacturing

Applications

- Nuclear energy

- Sustainable power generation

- Additive manufacturing in reactor design

Technology Validation:

This technology has been validated through numerical analysis of the design, as well experimental testing of the novel design. Results validated the feasibility of novel design which can enhance the safety as well as

Technology ID

2023-BIND-70304

Category

Chemicals & Advanced Materials/Green & Bio-Based Chemistry

Energy & Power Systems/Power Generation

Chemicals & Advanced Materials/Materials Processing & Manufacturing Technologies

Further information

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operational economics.

Related Publication: https://doi.org/10.1016/j.pnucene.2023.105042

TRL: 4

Intellectual Property:

Provisional-Gov. Funding, 2023-06-13, United States

Utility-Gov. Funding, 2024-05-23, United States

Keywords: Chemical Engineering. Circularity, Circular economy, Green Technology, Sustainability