Universität Stuttgart

Institute of Nuclear Technology
and Energy Systems

Bachelor Thesis

Thermodynamic Design and Optimization of Open-Air Brayton Cycles

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Objective:

The objective of this work is to develop and optimize the thermodynamic design of an open-air Brayton cycle, both in the simple and recuperated configurations.

Background:

The open-air Brayton cycle has been already extensively used by aerospace and power industries. Thanks to its high thermal efficiency and compact component sizes, it has recently gained interest as power production system in Micro Modular Reactors (MMRs).

Within the framework of the MISHA project, aimed at the investigation of a Heat Pipe-Cooled MMR, the thermodynamic design of an open-air Brayton cycle is determined. Two configurations are considered: the simple cycle and the recuperated one. Then, the thermodynamic designs obtained are optimized for different boundary conditions and constraints.

Approach:

- Literature study on open-air Brayton cycle
- Realization of the thermodynamic design for simple cycle (based on previous works)
- Modification of the design to include the recuperator
- Optimization considering different boundary conditions and constraints
- Thesis preparation and presentation

Requirements:

- Fundamentals of thermodynamics
- Experience in programming (preferably Matlab)
- Analytical thinking and self-initiative
- English language skills

Start: as soon as possible

Contact: M.Sc. Matthias Peiretti
Pfaffenwaldring 31 • 70569 Stuttgart
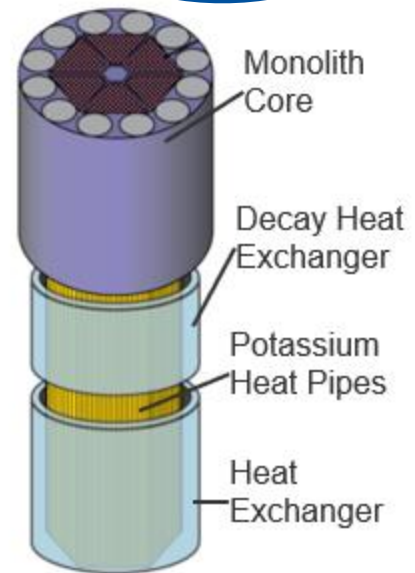matthias.peiretti@ike.uni-stuttgart.de
+49 (0) 711 685-69382

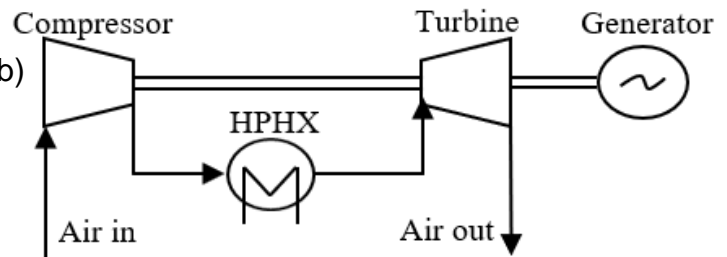Figure 1: Example of Heat Pipe-Cooled MMR [Mcclure, 2015]

Figure 2: Schematic representation of the open-air Brayton cycle

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