



Universität Stuttgart

Institute of Nuclear Technology
and Energy Systems

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Master/
Bachelor
Thesis/
Studienarbeit

Simulation and Control of a Recuperated Supercritical CO₂ Cycle

Objective:

The objective of this work is to simulate in ATHLET a recuperated supercritical CO₂ (sCO₂) cycle considering different control strategies and scenarios.

Background:

Heat Pipe-Cooled Micro Modular Reactor (HP-MMR) represent one of the currently investigated design to provide clean and sustainable energy in energy markets. As power conversion unit, supercritical carbon dioxide (sCO₂) Brayton cycle is being analyzed due to its high thermal efficiency and compactness.

Since the cycle should operate safely in off-grid applications, a proper control architecture should be developed. This works aims to investigate different control strategies in different scenarios (part load, start-up) using the system code ATHLET.

Approach:

- Literature study on operation and control of sCO₂ cycles
- Familiarization with simulation code ATHLET
- Implementation of different control strategies
- Simulations of different scenarios
- Thesis preparation and presentation

Requirements:

- Fundamentals of thermodynamics and control
- Experience in programming preferably in Matlab
- Interest in simulation and control
- Analytical thinking and self-initiative

Start: as soon as possible

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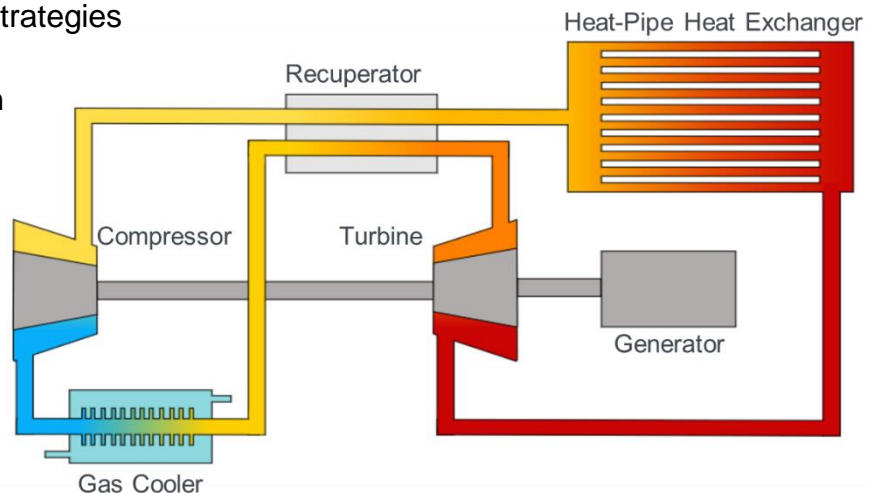


Figure 1: Schematic representation of the sCO₂ recuperated Brayton cycle



The University of Stuttgart would like to increase the proportion of women in the scientific field and is therefore particularly interested in applications from women. Severely disabled persons are given priority in the case of equal suitability.



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